Responses to CEC Data Requests Set One (60-Day Extension)

Amended Application for Certification for HYDROGEN ENERGY CALIFORNIA (08-AFC-8A) Kern County, California

Prepared for:
Hydrogen Energy California LLC

hydrogen energy california

Submitted to:

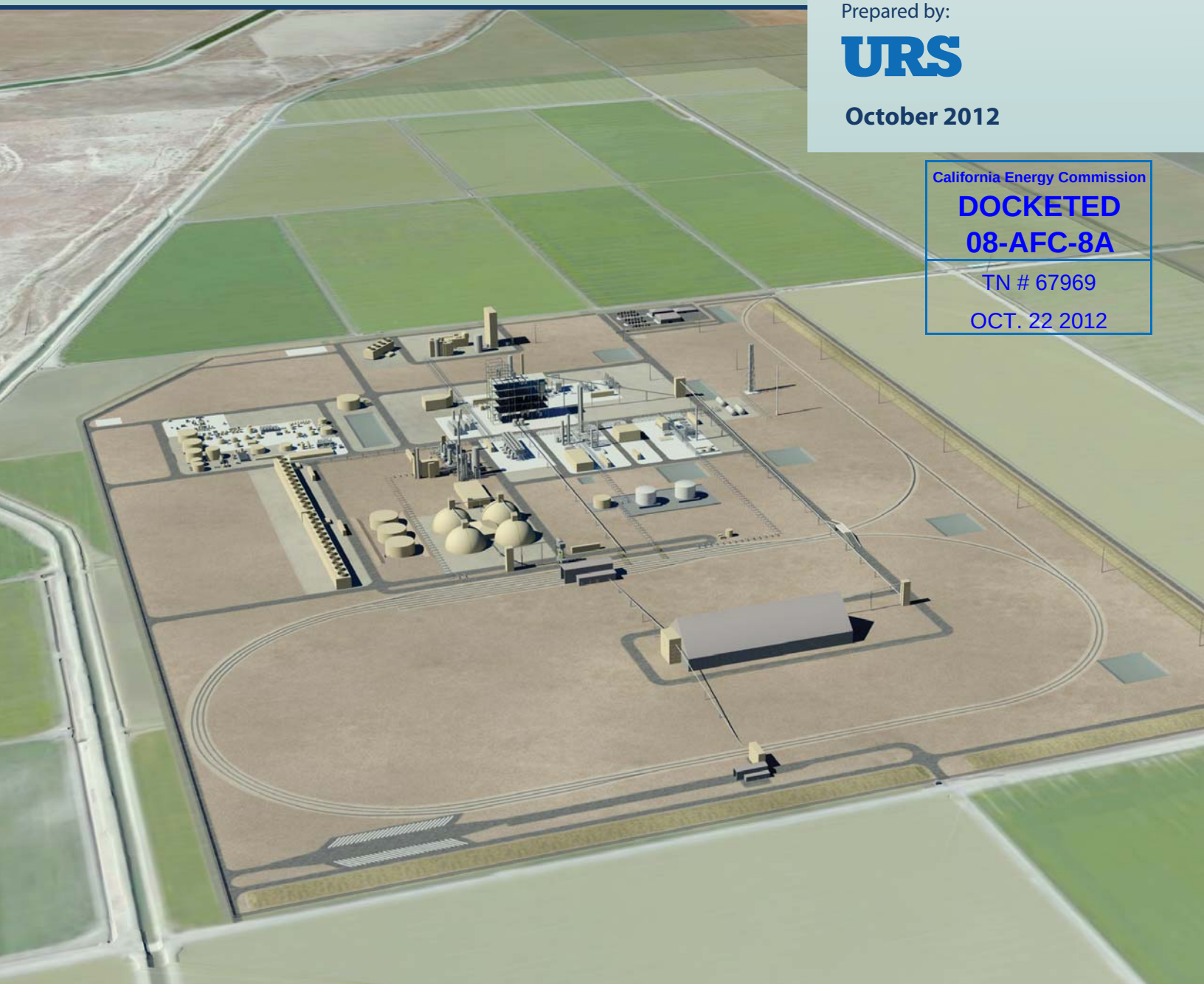
California Energy Commission

U.S Department of Energy

Prepared by:

URS

October 2012



RESPONSES TO DATA REQUESTS SET 1 (60-DAY EXTENSION)
FROM CALIFORNIA ENERGY COMMISSION (CEC)

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LIST OF ACRONYMS AND ABBREVIATIONS USED IN RESPONSES

AFC	Application for Certification
AICE	American Institute of Chemical Engineers
CCPS	Center for Chemical Process Safety
CEC	California Energy Commission
CSB	U.S. Chemical Safety and Hazard Investigation Board
EOS	Environmental Operating Solutions
°F	degrees Fahrenheit
FBA	Frazier Barnes and Associates
ft^2	square feet
HECA	Hydrogen Energy California
OSHRC	Occupational Safety and Health Review Commission
PHA	Process Hazard Analysis
PHAST	Process Heating Assessment and Survey Tool
ppm	parts per million
psig	pounds per square inch gauge
RMP	Risk Management Plan
U.S. EPA	United States Environmental Protection Agency

Technical Area: Hazardous Materials Management
Author: Dr. Alvin Greenberg

BACKGROUND

The project would store up to 3.8 million gallons of anhydrous ammonia (NH_3) in two double-walled vertical steel storage tanks. The Off-site Consequence Analysis (OCA) conducted by the applicant claims that a "worst-case" release would involve the release of the entire contents of one tank into the space between the inner and outer walls such that ammonia would be released from the Pressure Relief Valve (PRV) on the outer tank over one hour. While the analysis of this scenario is informative, it does not represent a "worst-case" release. Given the extraordinary volume of anhydrous ammonia that will be stored on site, staff believes that the catastrophic failure of the piping and/or valves through which anhydrous ammonia flows into and out of a storage tank is a much more plausible event that would result in greater impact and should be analyzed.

DATA REQUEST

A93. Please identify the piping and valves through which anhydrous ammonia will flow into and out of the storage tanks and conduct an OCA of at least two scenarios:

a. a horizontal jet release from a pipe where the contents of one tank empty in one hour, and

b. an instantaneous "egg shell" release from a pipe where the contents of the tank empty in the shortest reasonable time given the diameter of the pipe (a matter of minutes).

RESPONSE

The Applicant has made process safety management practices an inherent part of the Project, and has used proven industry standards and techniques to minimize the chances of any potential release of hazardous materials. As part of the application of process safety management, the Applicant has performed an historical examination of industry incidents related to ammonia storage and transfer, along with current practices for evaluating offsite consequence analysis from any release. The Applicant's ammonia storage and transfer configuration and associated design features preclude emptying the tank contents for all inlet lines and the pump suction line within minutes or an hour as suggested in the Data Request.

To estimate the potential for and extent of a release scenario from ammonia piping connected to the ammonia storage tanks, the conditions in which ammonia will be stored in the tanks have been described and their implications are presented. The features of the tanks and storage area were selected through inherently safe design principles based on years of safe ammonia operations. The selected features substantially reduce the risk and impact of unlikely release and its potential offsite consequence scenarios.

A schematic drawing showing the piping and valves through which anhydrous ammonia will flow into and out of the storage tanks is provided as Figure A93-1.

Tank and piping design features include the following:

(1) The refrigerated storage tanks operate very close to atmospheric pressure by keeping the liquid ammonia at a low temperature, instead of storing the liquid at higher pressure and ambient temperature. This approach prevents the rapid vaporization of ammonia in the event of a release, and is an inherently safer design. This is noted in the Center for Chemical Process Safety Guidelines, which state: "Refrigerated storage reduces the magnitude of the consequences of a release from a hazardous storage facility in three ways: by reducing the storage pressure, by reducing the initial flash [liquid vaporization] in the event of a leak, and by reducing or eliminating liquid aerosol formation in the event of a leak" (CCPS, 1993). Storing at ambient pressures reduces the extent of potential leaks, because the driving force pressure differential would be low (CCPS, 1993). A release at ambient pressure would not form a pressurized jet or otherwise result in rapid rate of release.

(2) All major fill lines will enter the tank above the liquid level, and will have vapor disengagement provisions that preclude liquid from within the tank from releasing back out through a fill line in the unlikely event of a fill line break.

(3) The tank outlet lines lead to the suction side of the ammonia pumps. The size of a potential leak from a break in the suction line is reduced due to the low pressure in the tank. In addition, an emergency isolation valve that can be closed from several observation points is affixed to the suction adjacent to the tank root valve to stop ammonia flow in the event of a piping leak. These process design features greatly reduce the size of a potential release, so that a release from this piping section would not result in a leak rate that could empty the tank contents within minutes or an hour.

(4) The ammonia transfer pipes are robust; they are protected by a concrete trench, and by concrete barriers surrounding the tank and pump areas. This protection precludes impacts from mobile equipment, which is a leading cause of line breaks. The concrete containment and trench areas not only protect pipes from impacts, but also contain and significantly reduce the evaporation of liquid ammonia that would pool from a leak.

(5) The design includes detection and controls that minimize the time and quantity of a potential release. Ammonia detectors connected to alarms and video surveillance will provide 24-hour monitoring of the storage tank area from the control room, where a control point for the isolation valve will also be located. Personnel are rapidly alerted of an ammonia release through the detectors, and by the visible ammonia plume.

(6) As discussed in the Amended Application for Certification (AFC), the double-integrity ammonia storage tank design provides for double containment within the tank itself. A release from the inner tank holding liquid ammonia would be contained by the walls of the outer tank.

The design features described above limit the likelihood and extent of any piping release scenarios. The Applicant has determined that the controlling release scenario for the ammonia storage system is a seal or gasket failure at the ammonia transfer pumps. This release scenario was modeled as a 3/8-inch hole in the pump discharge, which is the industry-accepted size for a shaft seal failure or gasket leak. The pump nozzle flanges and seals will be covered to shield any leaks from spraying. The pump was assumed to continue running for 5 minutes, at which time the pump would be stopped and the upstream and downstream piping would be isolated via emergency isolation valves. The presence of ammonia detectors and a video observation system makes this assumption of continued operation duration conservative. The

release would be contained in the pump containment area. Table A93-1 shows the results of this release scenario using the industry-recognized Process Heating Assessment and Survey Tool (PHAST) modeling program.

Table A93-1
Ammonia Storage and Transfer Release Scenario

Total Release Quantity	Release Containment Area	Release Conditions	Primary Control	Maximum Distance to 75 ppm from Source
0.8 ton at grade	100 ft² at grade	Liquid at -28 °F and 360 psig	Pump Containment Area	0.6 mile

Notes:
°F = degrees Fahrenheit
ft^2 = square feet
ppm = parts per million
psig = pounds per square inch gauge

A number of process design features are being used to prevent or reduce ammonia releases. Important process conditions are monitored continuously, with alarms set to alert operators of deviations from normal parameters. The ammonia storage tank and pump areas will be monitored by ammonia detectors, which will be located above the pump installations, ammonia storage tank, and piping systems. The storage tank and ammonia pump areas will also be continuously monitored by video in the control room, where remotely activated emergency isolation and pump stops can rapidly shut down the sources of the release. Although the detection and shutdown of the leak is anticipated to be rapid, the release was modeled conservatively with a 5-minute duration between the pump failure and isolation via the emergency stop system.

The details and selection of the monitoring and detection systems will be verified in a thorough review undertaken in the Process Hazard Analysis (PHA).

The Applicant further notes that emergency response team practices, including steps that would be taken by Hydrogen Energy California (HECA) personnel and public first responders, would further minimize the effects of any release. To build additional conservatism into the analysis, no credit has been taken for these measures in the release scenario presented above.

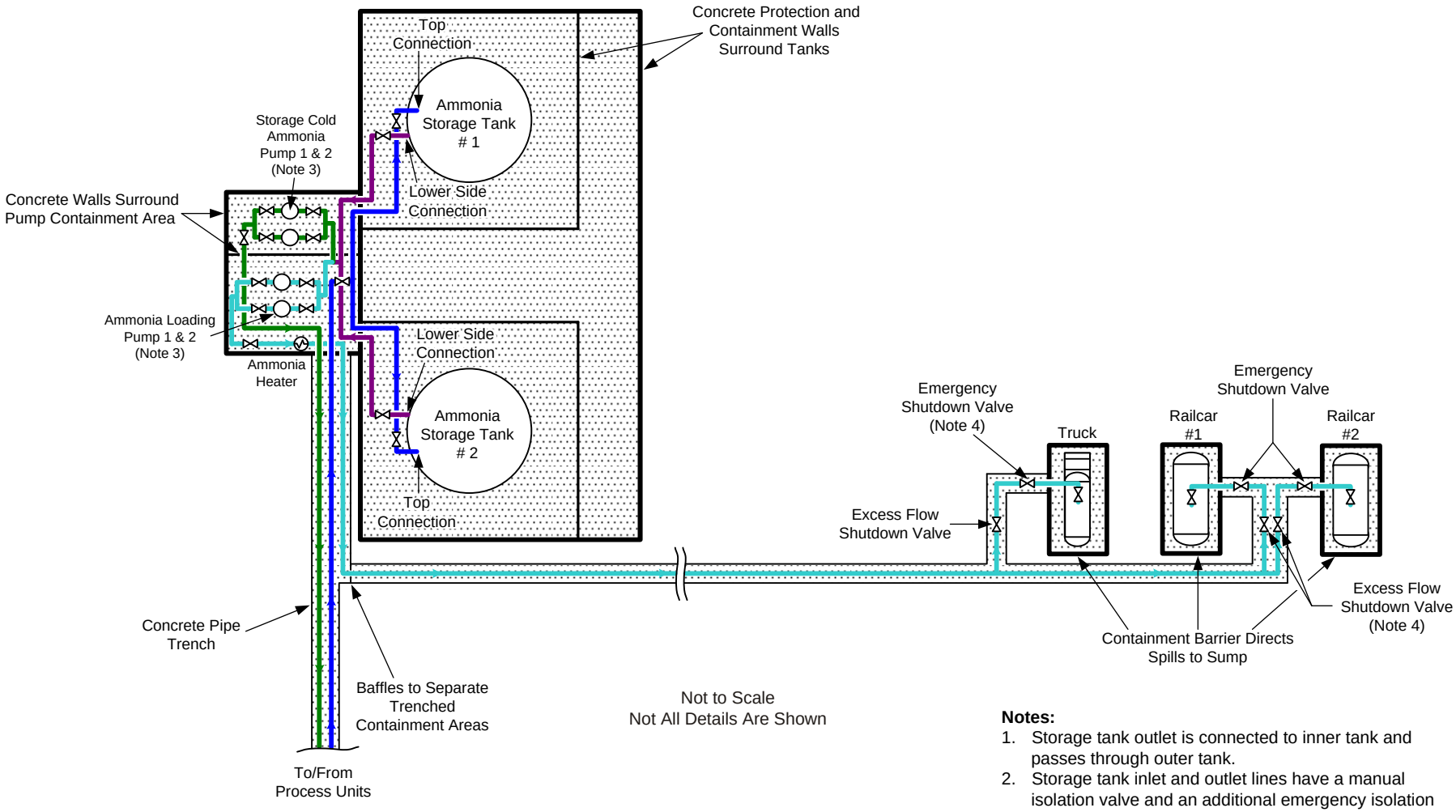
The scenario modeled for this analysis results in a maximum distance of 0.6 mile for 75 parts per million (ppm) ammonia concentration[1] from the release point (ammonia transfer pumps), most of which is within the Project Site and Controlled Area. All of the offsite sensitive receptors in the vicinity of the Project Site are located outside this 0.6-mile distance. While modeling this release scenario, the Applicant has assumed worst-case environmental conditions and model input parameters based on the U.S. Environmental Protection Agency's (EPA's) Risk Management Plan (RMP) Guidance.[2]

[1] California Energy Commission (CEC) staff uses a health-based airborne concentration of 75 ppm to evaluate potential accidental releases of ammonia. This level is significantly more stringent than the 200 ppm level used by the U.S. EPA and the California Environmental Protection Agency in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program. CEC staff have adopted the position that exposures to concentrations below these levels do not pose significant risk of adverse health impacts to sensitive members of the general public.

[2] 40 Code of Federal Regulations (CFR) Part §68.22 Offsite Consequence Analysis Parameters.

Reference

CCPS (Center for Chemical Process Safety), 1993. *Guidelines for Engineering Design for Process Safety*. Chapter 2: Inherently Safer Plants, Section 2.4.2, Refrigeration.



Notes:

1. Storage tank outlet is connected to inner tank and passes through outer tank.
2. Storage tank inlet and outlet lines have a manual isolation valve and an additional emergency isolation valve with remote operation.
3. Pumps have local and remote shutdowns.
4. Ammonia loading arms have a manual emergency shutdown valve and an excess flow valve that automatically stops flow in the event of a leak.

Source:
Fluor; Figure A93-1 (10/17/12)

- Stored Ammonia to Ammonia Unit Piping
- Product Ammonia to Ammonia Storage Piping
- Ammonia Storage Tank Outlet Piping (Notes 1 & 2)
- Stored Ammonia to Loading Piping

PRELIMINARY AMMONIA CONTAINMENT AND PIPING CONFIGURATION

October 2012
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE A93-1

10/19/12 vsa T:\HECA-SCS 2012\Data Requests\DR A93\FigA93-1_ammonia_cont_piping_101912.ai

DATA REQUEST

A96. Please provide any known hazardous materials accidental release history at similar facilities that utilize the same or similar chemical or engineering processes.

RESPONSE

Regulated hazardous materials that will be used or produced during project operations are described in the Amended AFC. HECA has surveyed the available literature to identify accidental releases of these materials. HECA has also reviewed the causes of these incidents to ensure that the lessons learned are incorporated into the project design and plant operating procedures. This review often indicated that the causes of previous incidents have long been resolved through corrective actions incorporated into today's industry practices and standards, which will be used for the HECA facilities.

Table A96-1 provides a listing of accidental releases of hazardous materials from facilities that use or store chemicals in a similar manner to HECA. The lessons learned and a brief summary of select preventive or mitigation measures for the releases are noted. While presenting this data, it must be understood that the HECA Project is unique and does not share many similarities to the processes and facilities presented in the table below.

Table A96-1
Hazardous Material Releases

Chemical Unit	Location	Date	Release/Incident	Summary	Comments
Ammonia Release, Ammonia Storage Unit	Rostock, Germany (AICE, 2006)	January 4, 2005	105 tons of liquid ammonia	Facility Difference: This incident occurred at an ammonia terminal. It is included to illustrate key design improvements within the HECA Project. Unusual ammonia startup sequence resulted in an overpressure of a double-walled atmospheric-pressure ammonia storage tank. Upon overpressure, a failure occurred at the bottom seam, releasing liquid ammonia.	The HECA Project will use the typical U.S. standard: Upon unexpected overpressure, the tank is designed to fail at a top seam, which avoids a liquid release. At the top seam, vapors are released at a low rate, with minimal offsite consequences.
Ammonia Release from Ammonium Nitrate Unit	Port Neal, IA (U.S. EPA, n.d.)	December 13, 1994	5,700 tons of ammonia	High-pressure steam added to ammonium nitrate in a confined area	Restrict temperatures, pressures, and concentrations in the ammonium nitrate plant, which avoids unstable conditions. HECA will conduct a process hazard analysis, implement and maintain a mechanical integrity program, and implement management of a change program as per Process Safety Management standard
Ammonia Release, Urea Unit	Lake Charles, LA (OSHRC, 2004)	July 28, 1992	Not disclosed	Rupture of urea reactor due to leaking of the protective liner and the misinterpretation of leak detection results.	Install modern effective leak detection system. Ensure identified leaks; initiate shutdown and corrections.
Ammonia Release, Urea Unit	Coffeyville, Kansas (Landress, 2010)	September 30, 2010	Not disclosed	Failure of flange weld on urea reactor.	Implement verification of quality assurance procedures for construction, including hold points for inspection of post weld heat treatment. Mechanical Integrity inspection of welds for lined vessels.

Chemical Unit	Location	Date	Release/Incident	Summary	Comments
Ammonia	Jonova, Lithuania (Mannan, 2005)	March 20, 1989	7,000 metric tonnes	Facility Difference: Obsolete plant design allowed addition of warm ammonia into a refrigerated storage tank. Single walled tank of different design. Addition of warm ammonia caused a sudden pressure rise. Vapor pressure increase exceeded relief valve capacity and the tank ruptured.	Inherently safer modern designs precool liquid ammonia additions to tank. Outer tank walls are structurally rated to withstand sudden failure of inner tank. "Weak Seam" design provides failure point in case of overpressure in the vapor space of the tank, avoiding liquids spills.
Methanol	Bethune Point Wastewater Treatment Plant, Daytona Beach, FL (CSB, 2007)	January 11, 2006	3,000 gallons	Cutting torch accidentally ignited vapors coming from methanol storage tank vent.	HECA will address the causes for this incident through safe work clearances, methanol hazard recognition; safety and hazard review in job planning; and use of vent flame arresters
Methanol	American Biofuels, Bakersfield, CA (FBA, n.d.)	February 17, 2006	Tote (200-350 gallons)	Tote of methanol came in contact with an electrical pump resulting in a fire.	Spill containment and electrical area classification will be used by HECA to address these risks.
Methanol	Kuala Lumpur, Malaysia (EOS, n.d)	February 28,2006	Gas within a 30 cubic meter methanol tank	Methanol tank explosion at a chemical plant during annual maintenance.	HECA will address the causes for this incident through safe work clearances, methanol hazard recognition; safety and hazard review in job planning
Methanol	Cleveland, OH (EOS, n.d)	April 20, 2006	Not Available	Workers removing a catwalk above methanol storage tank when sparks caused an explosion.	HECA will address the causes for this incident through safe work clearances, methanol hazard recognition; safety and hazard review in job planning.
Methanol	Meridian, Idaho (EOS, n.d)	July 9, 2006	Not Disclosed	Welding sparks explosion at biodiesel plant	There is insufficient information to draw appropriate conclusions.
Methanol	Quebec, Canada (EOS, n.d)	August 30, 2006	Not Available	Spark caused an explosion at a chemical plant.	There is insufficient information to draw appropriate conclusions.

Chemical Unit	Location	Date	Release/Incident	Summary	Comments
Methanol	Palau Enoe, Malaysia (EOS, n.d)	August 28, 2007	Not Disclosed	Explosion at the Petronas methanol plant.	There is insufficient information to draw appropriate conclusions.
Methanol	Prudhoe Bay Oil Field, AK (Juneau Empire, 2007)	October 16, 2007	2,000 gallons	2,000 gallons of a methanol mixture spilled onto a frozen pond. Transport line was plugged with ice. Operators did not properly respond to alarms.	Extremely low temperature conditions not expected at HECA location.
Methanol	American Ag Fuels, Defiance, OH (INC Now, 2010)	January 4, 2008	Not Disclosed	Explosion occurred when a manhole cover was left open accidentally.	HECA will address the causes for this incident through safe work clearances, methanol hazard recognition; safety and hazard review in job planning.
Methanol	Kandla, India (Express India, 2008)	February 8, 2008	500 tons	500-ton tank storing methanol caught fire.	Safety system in the tank failed to work when pressure inside the tank reached its maximum. A mechanical integrity program will be implemented to ensure ongoing reliability for mechanical systems.
Hydrogen	Ilford, Essex UK (Health & Safety Executive, 1976)	April 5, 1975	Explosion	Explosion caused by the mixture of hydrogen and oxygen with an ignition source. Resulted in extensive damage to an electrolytor plant and release of caustic electrolyte.	Voltage, temperature, and gas analysis log sheets were not recorded and reviewed in a consistent manner.
Hydrogen	Fort McMurray, Alberta (Kelly, 1998)	Late 1978	Not Disclosed	Appeared to be multiple tube failures in a hydrotreater heat exchanger.	There is insufficient information to draw appropriate conclusions.
Hydrogen	Sarnia, Ontario (Slater, 1978)	April 20, 1978	Not Disclosed	Vapor cloud explosion at a benzene plant.	There is insufficient information to draw appropriate conclusions.

Chemical Unit	Location	Date	Release/Incident	Summary	Comments
Hydrogen	Martinez, CA (Slater, 1978)	September 5 (year is not disclosed)	Not Disclosed	Fire or explosion involving a hydro-treater.	There is insufficient information to draw appropriate conclusions.
Hydrogen	Sodergaura, Japan (Mannan, 2005)	October 16, 1992	Not disclosed	Release of hydrogen occurred from a rupture on a feed/reactor effluent heat exchanger as the plant was being started up after a shutdown.	There is insufficient information to draw appropriate conclusions.

Note:
HECA = Hydrogen energy California

References

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OSHRC (Occupational Safety and Health Review Commission), 2004. Investigation Report Docket 93-0628. Secretary of Labor, Complainant, v. Arcadian Corporation, Respondent.

Slater, D.H., 1978. Vapor Clouds, Chem. and Ind., p. 295. May 6.

U.S. EPA (U.S. Environmental Protection Agency), n.d. Chemical Accident Investigation Report, Terra Industries, Inc., Nitrogen Fertilizer Facility, Port Neal, Iowa.

BACKGROUND

The project owner stated at the June 20, 2012 workshop that the project may ship off-site some of the 3.8 million gallons of anhydrous ammonia stored on-site in two tanks. In order to properly asses the impacts of the transfer of anhydrous ammonia to tanker trucks and/or rail cars, staff will need additional information about the transfer facility. An Off-site Consequence Analysis (OCA) conducted by the applicant is also needed.

DATA REQUEST

A97. Please provide a schematic diagram of the anhydrous ammonia transfer facility showing the piping and valves through which anhydrous ammonia will flow out of the storage tanks, secondary containment should a spill occur during transfer operations, the location, type, and detection limits of ammonia sensors, and conduct an OCA of the worst-case accidental release during transfer to tanker trucks and rail cars.

RESPONSE

See Figure A93-1 in the response to Data Request A93 for the schematic drawing of the anhydrous ammonia transfer facility showing the piping and valves through which anhydrous ammonia will flow out of the storage tanks and the secondary containment should a spill occur during transfer operations. The response to Data Request A93 also provides a description of the ammonia storage tank and transfer pipe protection systems.

The controlling release scenario for the ammonia load-out system was modeled as a spill at the load-out station. The duration of this ammonia release was assumed to be 5 seconds, which is the estimated maximum reaction time for the automatic excess flow valve to shut off the system (see description below). The release was modeled as a horizontal jet, located at 15-foot elevation, with full pump flow and pressure, and through a fully open loading pipe. A containment sump would capture the portion of the release that does not immediately vaporize and falls in the containment area. The containment sump would reduce the evaporation of the resulting pool of liquid ammonia. The liquid in the open-ended loading arm (about 20 feet in length) would also drain into the containment sump after the automatic shutdown occurs. Table A97-1 shows the results of this release scenario using the industry-recognized PHAST modeling program.

For the ammonia load-out system, several process design features will be used to prevent or reduce ammonia releases. Important process conditions are monitored continuously, with alarms set to alert operators of deviations from normal parameters. Each load-out area will be monitored by ammonia detectors. The loading areas are also continuously monitored by video in the control room, where remotely activated emergency isolation and pump stops can rapidly shut down the sources of the release. The loading operator will be in radio contact with the control room at all times, and will also have local activation of the emergency shutdown system. Finally, an excess flow shutoff system will be provided at each loading arm to automatically stop the flow of ammonia if excessive flow at the loading arm indicates a leak. This system will close a fast-acting shut off valve and shut down the ammonia loading pump. The estimated reaction time for completely stopping the ammonia flow is less than 5 seconds.

Table A97-1
Ammonia Load-Out System Release Scenario

Total Release Quantity	Release Containment Area	Release Conditions	Primary Control	Maximum Distance to 75 ppm from Source
180 pounds at 15-foot elevation	100 ft^2 at grade	Liquid at -68 °F and 220 psig	Automatic Excess Flow Shut Off; Containment Sump; Attended Operation	0.5 mile

Notes:
°F = degrees Fahrenheit
ft^2 = square feet
ppm = parts per million
psig = pounds per square inch gauge

The details and selection of monitoring, detection, and emergency shut down systems will be verified in a thorough review undertaken in the PHA.

The Applicant further notes that emergency response team practices, including steps that would be taken by HECA personnel and public first responders, would further minimize the effects of any release. To build additional conservatism into the analysis, no credit has been taken for these measures in the release scenario presented above.

The scenario modeled for this analysis results in a maximum distance of 0.5 mile for 75 ppm ammonia concentration[3] from the release point (ammonia load-out system), most of which is within the Project Site and Controlled Area. All of the offsite sensitive receptors in the vicinity of the Project Site are located outside this 0.5-mile distance. While modeling this release scenario, the Applicant has assumed worst-case environmental conditions and model input parameters based on U.S. EPA's RMP Guidance.[4]

[3] CEC staff uses a health-based airborne concentration of 75 ppm to evaluate potential accidental releases of ammonia. This level is significantly more stringent than the 200 ppm level used by the U.S. EPA and the California Environmental Protection Agency in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program. CEC staff have adopted the position that exposures to concentrations below these levels do not pose significant risk of adverse health impacts on sensitive members of the general public.

[4] 40 CFR Part §68.22 Offsite Consequence Analysis Parameters.

Technical Area: Soil and Water Resources
Author: Marylou Taylor

BACKGROUND

Section 5.14.1.8 of the Amended Application for Certification (AFC) indicates that although previous submittals, namely the Preliminary Hydrology Study and the Draft Drainage, Erosion, and Sedimentation Control Plan (filed November 2010 in response to Data Request 202), no longer reflect the updated project, the overall approach for the drainage system and storm water management remain the same.

DATA REQUEST

A115. Please submit an updated Hydrology Study that accurately reflects the Amended AFC.

RESPONSE

The preliminary hydrology study has been updated to reflect the Amended AFC, and is included as Appendix B in the updated Draft Drainage, Erosion, and Sedimentation Control Plan provided in Attachment A116-1.

DATA REQUEST

A116. Please submit an updated Draft Drainage, Erosion, and Sedimentation Control Plan that accurately reflects the Amended AFC.

RESPONSE

The updated Draft Drainage, Erosion, and Sedimentation Control Plan is provided in Attachment A116-1.

ATTACHMENT A116-1
DRAFT DRAINAGE, EROSION, AND SEDIMENTATION CONTROL PLAN

DRAFT DRAINAGE, EROSION, AND SEDIMENTATION CONTROL PLAN

HYDROGEN ENERGY CALIFORNIA PROJECT

PREPARED FOR:

HYDROGEN ENERGY CALIFORNIA LLC

OCTOBER 2009
Revision: November 2010
Revision: September 2012

PREPARED BY:
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CONTENTS

HYDROGEN ENERGY CALIFORNIA PROJECT DRAFT DRAINAGE, EROSION, AND SEDIMENTATION CONTROL PLAN

INTRODUCTION

Hydrogen Energy California LLC (HECA LLC) is proposing an Integrated Gasification Combined Cycle (IGCC) polygeneration project (hereafter referred to as HECA or the Project). HECA LLC is owned by SCS Energy California LLC. The Project will gasify a 75 percent coal and 25 percent petroleum coke (petcoke) fuel blend to produce synthesis gas (syngas). Syngas produced via gasification will be purified to hydrogen-rich fuel, which will be used to generate low-carbon baseload electricity in a Combined Cycle Power Block, low-carbon nitrogen-based products in an integrated Manufacturing Complex, and carbon dioxide (CO_2) for use in enhanced oil recovery (EOR).

The products and power produced by the Project have a lower carbon footprint compared to similar products produced from more traditional fossil fuel facilities. This low-carbon footprint is accomplished by capturing more than 90 percent of the CO_2 in syngas by the Gasification Block and transporting it for use in EOR, which results in simultaneous sequestration (storage) of the CO_2 in a secure geologic formation. CO_2 from HECA will be transported for use in EOR in the adjacent Elk Hills Oil Field (EHOF), which is owned and operated by Occidental of Elk Hills, Inc. (OEHI). As discussed further below, the OEHI EOR Project will be separately permitted by OEHI through the Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR).

In addition to the new HECA facility, the Project will include the linear facilities as shown on Figures 2 and 3 which includes an electrical transmission line, a natural gas supply pipeline, water supply pipelines consisting of Process Water pipeline for brackish groundwater supplied from Buena Vista Water Storage District (BVWSD) for raw water purposes, a Potable Water pipeline from West Kern Water District (WKWD), a carbon dioxide (CO_2) pipeline to the OEHI CO_2 processing facility, and an Industrial Railroad Spur for coal delivery and product export.

This Drainage, Erosion, and Sedimentation Control Plan (DESCP) has been prepared to demonstrate that construction activities associated with the Project will not result in an increase in off-site flooding potential and/or sedimentation production and that the Project will meet local, state, and federal regulatory requirements associated with the protection of water quality and soil resources. The DESCP includes the following elements:

A. Project Vicinity and Project Location Map. Figure 1 and Figure 2, respectively, show the location of all Project elements, with depictions of all significant geographic features, including swales, creeks, and sensitive areas. (Note: more detailed maps for linear features will be prepared for the final DESCP once design has been advanced.)

B. Site Delineation. Figures 3, 4, 5, 6, and 7 provide a site delineation that includes the boundary lines of all construction areas and the location of existing and proposed structures, pipelines, temporary construction facilities, roads, and drainage facilities.

C. Watercourses and Critical Areas. Figures 2, 3, and 5 show the location of all nearby watercourses, including swales, creeks, drainage ditches, and other important surface water bodies.

D. Drainage Map. Figures 5, 6, and 7 show watercourses, critical areas and existing and proposed drainage systems. Figures B-1 and B-2 in Appendix B provide additional information regarding on-site drainage features during operations and construction phases.

E. Drainage Narrative. The drainage narrative presents a description of the drainage measures to be taken to protect the site and downstream facilities. These include site-specific Best Management Practices (BMPs) to be implemented during construction, and a schedule of the timing and implementation of erosion and sediment control measures as shown on Figure 8 and erosion and sedimentation control notes.

F. Clearing and Grading Plans. Figures 6 and 8 provide the delineation of areas to be cleared, areas to be graded and areas to be preserved. Specific details of vegetation clearance and soil excavation and grading associated with the water supply and discharge pipelines will be developed as Project design is advanced prior to construction.

G. Clearing and Grading Narrative. This presents identification of the quantities of material excavated or filled for the site and all Project elements, including those materials removed from the site.

H. Best Management Practices Plan. Figure 8 shows the location of the Best Management Practices (BMPs) to be implemented during Project construction.

I. Best Management Practices Narrative. This presents a description of the location, timing, and maintenance schedule for the proposed BMPs.

PROJECT LOCATION

The Project Site consists of approximately 453 acres located near a petroleum-producing area in Kern County, California, as shown in Figure 1. The Project Site is located in a predominantly agricultural area of the county, 1.5 miles northwest of the unincorporated community of Tupman. The Project Site is located within Section 10 of Township 30 South, Range 24 East in Kern County. The Project Site Assessor's Parcel Numbers (APNs) are as follows:

- Part of 159-040-02
- Part of 159-040-16
- Part of 159-040-18

The Project Site and Controlled Area are shown on Figures 2 and 3. The APNs associated with the Controlled Area are as follows:

- 159-040-04
- 159-040-11
- Remnant part of 159-040-16
- Remnant part of 159-040-18
- 159-190-09
- 159-040-17

The Project Site is predominantly used for agricultural purposes, including cultivation of cotton, alfalfa, and onions. Land use in the vicinity of the Project consists primarily of agricultural uses. Adjacent land uses include Adohr Road and agricultural uses to the north; Tupman Road and agricultural uses to the east; agricultural uses and an irrigation canal to the south; and Dairy Road right of way and agricultural uses to the west. The West Side/Outlet Canal, the Kern River Flood Control Channel, and the California Aqueduct (State Water Project) are approximately 500, 700, and 1,900 feet south of the Project Site, respectively.

SITE DELINEATION

Construction activities for the Project will occur throughout the 42-month construction period and include on-site and off-site facilities. Figures 2, 3 and 4 show the proposed route of the Project Linears and details of the Project Site temporary construction facilities. Detailed maps indicating the location of all Project elements at a 1"=100' scale or other appropriate scales will be provided in the final DESCP.

Project Site

Construction laydown and parking areas will be located entirely within the 453-acre Project Site. There will be seven entrances to the Project Site during construction. One entry will be provided on Adohr Road for workers, material deliveries and equipment deliveries. Six entries will be provided along Dairy Road for workers, material deliveries, equipment deliveries, and shipment of imported construction fill material.. Initial site preparation operations will include on-site construction of temporary access roads, craft parking, laydown areas, office and warehouse facilities, installation of erosion control measures, and other improvements necessary for construction.

Project Linear Facilities

The Project Linear Facilities are depicted on Figures 2 and 3.

Electrical Transmission Line. A 230-kilovolt (kV) transmission line will interconnect the Project switch yard at the Power Block to a future Pacific Gas and Electric Company's (PG&E's) switching station. The transmission line will be constructed and owned by HECA up to the point of interconnect with the PG&E switching station. The future PG&E switching station connects to the existing PG&E Midway-Wheeler 230 kV transmission line.

The transmission line route leaves the east side of the Project Site at Tupman Road, turns and continues north to Adohr Road, then turns and continues east, crossing Morris Road, to the new PG&E switching station near Elk Valley Road. The transmission route is approximately 2 miles in length. Construction of the new transmission line will require approximately 3 months.

Process Water Supply. The Project will use brackish groundwater supplied by BVWSD who will own and construct the process water pipeline. The brackish water will be treated on site as raw water to meet process and utility water requirements.

The process water pipeline route will run from Seventh Standard Road to the Project Site, along the existing BVWSD road on the northwest side of the West Side Canal. The process water pipeline will be approximately 15 miles in length. Construction of the process water pipeline is expected to take approximately 6 months to complete.

Potable Water Supply. For drinking and sanitary use, the Project will use potable water supplied by a groundwater well owned by WKWD and transported to the Project Site via a potable water pipeline,

constructed and owned by HECA LLC. The pipeline begins approximately 1 mile east of the northwest corner of the Project Site and will be placed within the Electrical Transmission Line corridor Right-of-Way.

Natural Gas Supply. A natural gas interconnection will be made with the existing PG&E natural gas pipeline Inlet, which is located north of the Project Site. PG&E will construct and own the natural gas pipeline. The interconnect will consist of one tap off the existing natural gas pipeline, one metering station at the tap off and one metering station at the southwest side of the Project Site. Horizontal Directional Drilling (HDD) may be used to install the pipeline under Interstate 5, the East Side Canal, Highway 58, and the adjacent RailAmerica railroad line. An assessment of the crossing methods to use (open cut or HDD) will be made for all other water bodies along the pipeline route. The natural gas line is approximately 13 miles in length. Construction of the natural gas line will require approximately 6 months.

Carbon Dioxide Pipeline. The Project will include construction of a carbon dioxide (CO_2) pipeline to transfer carbon dioxide captured during the gasification process at the Project Site to the OEHI CO_2 processing facility. The CO_2 pipeline route will leave the southwest portion of the Project Site and will use Horizontal Directional Drilling (HDD) to pass under the Outlet Canal, the Kern River Flood Control Channel (KRFCC), and the California Aqueduct (Aqueduct). On the south side of the Aqueduct, the route extends southeast and south to the OEHI facility. The route is approximately 3 miles in length. OEHI will own and construct the CO_2 pipeline.

An assessment of the crossing methods to use (open cut or HDD) will be made for all other water bodies along the pipeline route. Construction of the carbon dioxide pipeline will take approximately 6 months.

Industrial Railroad Spur. Alternative 1 for the transportation of coal to the Project Site is a new railroad spur, approximately 5-miles in length, which would connect to the existing San Joaquin Valley Railroad (SJVRR) Buttonwillow railroad line, north of the Project Site. This railroad spur will deliver coal unit trains, as well as export products during operations. If available, the railroad spur will also be used to deliver plant equipment to the Project Site during construction.

Public and private at-grade rail crossings will be required. Construction of the railroad spur is expected to span approximately 5 months.

Under Alternate 1, the Project Site would be equipped with a rail unloading and transfer system to unload coal from unit trains and convey the coal to a storage barn. The transfer conveyor is fully enclosed for weather protection and to control fugitive dust. All related coal feedstock buildings are fully enclosed. Dust suppression spray systems, dust collection systems, and/or transfer design are used to control fugitive dust.

SOIL CHARACTERIZATION

The Soil Characterization for the Project Site and the Project Linear Facilities was developed using the Soil Survey of Kern County, California, Northwestern Part (Soil Survey), prepared by the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS, 1988). Additionally, information for the Soil Survey was prepared by the USDA Natural Resources Conservation Services (USDA NRCS, 2009). Additional soil data was generated by the USDA NRCS Web Soil Survey (WSS) database (NRCS, 2012) The WSS database (WSS, 2012) contains official USDA soil survey information as viewable maps and tables for more than 2,300 soil surveys in the United States and its territories.

Project Site

The predominant soils at the Project Site and along the associated linears consist of clays, loamy sands, gravely sandy loams, silt loams, fine sandy loams, and sandy loams. The soil mapping units at the Project Site include the Buttonwillow Clay, 0 to 2 percent slopes; and the Lokern Clay, 0 to 2 percent slopes.

Project Linear Facilities

Electrical Transmission Line. The soil mapping units along the electrical transmission line linear include the Buttonwillow clay, 0 to 2 percent slopes; and Lokern clay, 0 to 2 percent slopes.

Process Water Pipeline. The soil mapping units along the process water linear includes the Lokern clay, 0 to 2 percent slopes; Lokern clay loam, saline-alkali, 0 to 2 percent slopes; and Buttonwillow clay, 0 to 2 percent slopes.

Potable Water Pipeline. The soil mapping units along the potable water linear includes the Buttonwillow clay, 0 to 2 percent slopes; and Lokern clay, 0 to 2 percent slopes.

Natural Gas Pipeline. The soil mapping units along the natural gas linear include the Lokern clay, 0 to 2 percent slopes; Buttonwillow clay, 0 to 2 percent slopes; Kimberlina fine sandy loam, 0 to 2 percent slopes; Garces silt loam, 0 to 2 percent slopes, Milham sandy loam, 0 to 2 percent slopes, Garces silt loam, hard substratum, 0 to 2 percent slopes; Westhaven fine sandy loam, 0 to 2 percent slopes; Cajon loamy sand, 0 to 2 percent slopes; and Panoche clay loam, saline-alkali, 0 to 2 percent slopes.

Carbon Dioxide Pipeline. The soil mapping units along the carbon dioxide (CO_2) linear include the Lokern clay, 0 to 2 percent slopes; Elkhills sandy loam, 9 to 50 percent slopes; Cajon loamy sand, 0 to 2 percent slopes; Buttonwillow clay, 0 to 2 percent slopes; and Cajon loamy sand, 0 to 2 percent slopes.

Industrial Railroad Spur. The soil mapping units along the industrial railroad spur linear include the Lokern clay, 0 to 2 percent slopes; Buttonwillow clay, 0 to 2 percent slopes; Kimberlina fine sandy Loam, 0 to 2 percent slopes; Grace silt loam, 0 to 2 percent slopes; and Milham sandy loam, 0 to 2 percent slopes.

Table A-1 – Soils Mapping Units included in Appendix A presents characteristics of the soils survey described within the Project Site and along the Project linear facilities.

WATERCOURSES AND CRITICAL AREAS

The Project Site is located in the southern end of the Central Valley region of California, as shown on Figures 1 and 2. Figure 2 shows the Project Site on U.S. Geological Survey topographic mapping. The topography at the Project Site is characterized by relatively flat, low-lying terrain that slopes very gently from southeast to northwest. As shown on Figure 5, the existing site drainage is affected by roads, levees, and irrigation ditches.

Average annual precipitation is approximately 6.23 inches, with more than 75 percent occurring between November and March. The average annual precipitation is based on rainfall records for the Bakersfield WSO Airport, Station no. 040442, from October 1, 1937, to December 31, 2006. The 50-year, 24-hour, and the 10-year, 24-hour rainfall amounts for the Project Site are approximately 2.7 inches and 1.81 inches, respectively, based on the National Oceanic and Atmospheric Administration Atlas 14, Volume 6, Version 2 for California.

Several regional irrigation and water supply canals are located in the vicinity of the Project Site, (Figures 3, 5, and 9). The Outlet and West Side Canals are located approximately 0.1 mile and 0.2 mile south of the Project Site, respectively. The East Side Canal is located approximately 0.25 mile east of the Project Site boundary. The California Aqueduct, which was constructed in the 1970s and supplies agricultural and municipal areas in Southern California, is located parallel to, and west of the West Side and Outlet Canals, approximately 0.5 mile south of the Project Site. The California Aqueduct generally runs north-south and is the major conveyance feature that brings water from Northern to Southern California for the California State Water Project. The aqueduct is 444 miles long and is mostly an open concrete-lined canal. The canal width and depth vary along the length of the aqueduct, but it is generally approximately 50 feet wide and approximately 30 feet deep. An irrigation canal extends generally from the east to the west from Tupman Road along the southern border of the Project Site. This irrigation canal connects the East Side Canal with the West Side and Outlet Canal.

An irrigation ditch crosses approximately three-quarters of the Project Site from south to north, runs diagonally northwest through the former natural fertilizer manufacturing plant area, and ends just south of Adohr Road. This ditch is approximately 7 feet deep and feeds the smaller irrigation ditches that traverse the Project Site from north to south and east to west around the crop fields. These irrigation ditches are fed with water pumped from the canal south of the Project Site, which is supplied by the West Side Canal and the East Side Canal.

Based on a review of historical aerial photographs (see the Environmental Data Resources, Inc., Aerial Photo Decade Package, Dated November 21, 2008, in Appendix B of the Phase I Environmental Site Assessment, within Appendix L of the Revised Application for Certification) and site reconnaissance, it was determined that the irrigation/drainage ditch crossing the Project Site formerly conveyed water north of the Project area through an irrigation canal north of Adohr Road. The aerial photos illustrate clearly that by 1967 the portion of the canal north of Adohr Road was filled and abandoned. The canal no longer connects to the property north of the Project Site and is used only for irrigation and drainage within the Controlled Area of the HECA Project. Therefore, filling in the canal and the on-site ditches will not impact any off-site drainage paths of adjacent properties.

The Kern River Flood Control Channel is located approximately 0.5 mile south of the Project Site. This channel conveys overflows from the Kern River during flood events. The floodplain associated with this channel does not extend onto the Project Site. According to the Federal Emergency Management Agency Flood Insurance Rate Maps (see Figure 9, 100-Year Inundation Map), the Project Site is not located within an area identified as having flood hazards or shallow groundwater (FEMA, 2008).

The Kern River is located approximately 5 miles southeast of the Project Site and is regionally large and biologically important jurisdictional Water. It flows west-southwest through the city of Bakersfield, under State Route (SR) 119, east of Tupman Road. The river changes course and then flows southeastward into Lake Webb.

Project Site

The Project Site is within agricultural fields that have a generally flat topography. The only existing drainage features within the Project Site are irrigation ditches. These irrigation ditches are excavated into dry land and are not considered jurisdictional waters. These irrigation ditches are fed by the West Side Canal and the East Side Canal and do not have a direct hydrological connection to the Kern River or Kern River Flood Control Channel.

In general, the existing roads in the vicinity of the site are slightly raised above the agricultural fields. Barriers that limit runoff from upstream (i.e., from the east and south) areas flowing onto the site are

created by Tupman Road along the eastern boundary of the site, and the levee associated with the irrigation canal south of the site. Similarly, the roads at the downstream edges of the site (e.g., Dairy Road along the western boundary and Adohr Road along the northern boundary) limit the amount of runoff that leaves the Project Site.

Construction, operation, or maintenance of the Project could affect surface water quality of nearby canals through inadvertent spills or discharges. Surface water impacts, if any, are anticipated to be a byproduct of short-term construction activity and consist of increased turbidity due to erosion of newly excavated or placed soils. Activities such as grading can potentially increase rates of erosion during construction. In addition, construction materials could contaminate runoff or groundwater if not properly stored and used. Best Management Practices (BMPs) such as, compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to proper material handling procedures will ensure effective mitigation of these short-term impacts.

Implementing these BMPs and retaining surface runoff on-site during construction will minimize the potential impact on adjacent water bodies. A construction Storm Water Pollution Prevention Plan (SWPPP) will be prepared and implemented in accordance with the General Permit for Construction Activities.

For the post-developed condition, the Project Site will be graded and drained so that all runoff will be retained on-site. The increase in runoff caused by the impermeable surface proposed will be mitigated by retention basins strategically located around the Project Site (Figures 6 and 7), which will retain surface runoff from process and open areas. All temporary laydown areas will be restored to preconstruction conditions after construction.

Project Linear Facilities

The HECA Project design incorporates avoidance, minimization, and conservation measures. These measures include relocating the natural gas pipeline to avoid portions of the Coles Levee Ecosystem Preserve. Proposed pipelines constructed under large aquatic features—such as the Outlet Canal, Kern River Flood Control Channel, and the California Aqueduct—will avoid direct impacts using horizontal directional drilling. The seasonally ponded depressions affected by construction of the natural gas pipeline, which will be an underground facility, would be reestablished within one season following completion of construction. Therefore, the Project would not permanently impact potentially jurisdictional waters of the United States or the State of California.

Electrical Transmission Line. The electrical transmission line extends east from the Project Site, north to Adohr Road and then eastward again to a new PG&E switching station near Elk Valley Road. The majority of the approximately 2-mile route is adjacent to road shoulders and within areas of active agriculture.

Process Water Pipeline. Land in the vicinity of the process water pipeline is primarily used for farming (mainly alfalfa, cotton, and wheat cultivation), and orchards (pistachio). Much of the land between the West Side Canal and the Kern River Flood Control Channel is undeveloped.

Potable Water Pipeline. The potable water pipeline will be placed within the right-of-way corridor for the electrical transmission line. This corridor is adjacent to road shoulders and within areas of active agriculture.

Natural Gas Pipeline. Existing land use within 0.25 mile of the approximately 13-mile natural gas linear primarily consists of roadways and agricultural land, including row crop cultivation, orchards, and dairies. Although agricultural land would be temporarily disturbed due to the installation of the pipeline, construction would be scheduled to minimize disruption to existing land uses and the pipeline would be located along the edges of existing roads and agricultural uses, to the extent possible. Upon completion of the pipeline installation, agricultural uses may be reestablished over the pipeline route.

Carbon Dioxide Pipeline. The carbon dioxide pipeline crosses multiple dry swales. Although the vigor of the plants suggests that water flows through the swales during wet periods, the dominance of upland species and lack of hydrophytic species indicate that these swales are not federal jurisdictional wetlands. Additionally, the drainage features on the south side of the California Aqueduct are now isolated and no longer connect to the Kern River or other significant drainage feature due to the construction of the aqueduct. Existing land uses in the vicinity of the 3-mile carbon dioxide pipeline primarily include farming (mainly alfalfa cultivation), undeveloped areas, and resource extraction (oil production). The carbon dioxide pipeline would also cross under the West Side Canal, Kern River Flood Control Channel, and the California Aqueduct.

Industrial Railroad Spur. Existing land use in the vicinity of the industrial railroad spur is primarily farming (mainly alfalfa, cotton, and wheat cultivation).

DRAINAGE MAP

Figure 5 shows the existing drainage of the Project Site. Figure 6 shows the proposed preliminary drainage and grading concept and Figure 7 illustrates the delineation between the potentially contaminated runoff and noncontact runoff for the HECA Project.

Figures B-1 and B-2 in Appendix B further delineate the site drainage during operation and construction phases, respectively.

DRAINAGE NARRATIVE

Storm water management for the Project is designed to avoid direct discharge to surface waters. The site drainage system will be separated in two distinct systems (Figure 7): 1) potentially contaminated storm water runoff from the process, power block and administration building areas, and 2) noncontact storm water runoff from the undeveloped open areas.

The primary sources of wastewater at the Project will be from cooling tower blowdown, raw water treatment, process condensate wastewater from the gasifier, the sour water stripper, the Acid Gas Removal (AGR) unit, and the Urea Plant. Process wastewater will be treated on-site and recycled to the cooling towers as make-up water. Cooling tower blowdown will also be treated on-site to produce demineralized and utility water. The reject from the cooling tower blowdown treatment plant will be sent to a zero liquid discharge (ZLD) system. The ZLD solids will be disposed of at an approved off-site facility.

Existing drainage patterns outside of the Project Site will remain undisturbed. Excess off-site runoff will follow existing drainage patterns to convey flow around the Project Site. Existing drainage ditches located at the site property boundary will be improved where necessary. According to the A.L.T.A. Survey prepared for the HECA Project, two easements exist “for the purpose of conveying and draining water to and from the Cauzza Property” which are plotted. Numerous other un-plotted easements are also referenced on the A.L.T.A. Survey for “canals, drains, ditches and laterals”.

Sanitary wastewater from the Project restrooms, showers, and kitchens will be disposed to a private on-site sewage disposal system consisting of a conventional septic tank and leach field. No municipal sanitary sewer system is available in the vicinity of the Project Site.

Preliminary site drainage is presented in Figure 7.

Retention basins and storm water collection/conveyance systems will be designed in accordance with the Kern County Development Standards. The retention basin locations are shown in Figures 6 and 7 and on Figure B-1 in Appendix B.

Storm water generated at the Project Site will be managed as follows:

- Storm water runoff from process areas inside the main plant area will be routed to lined on-site storm water retention basins. Clean storm water will be used as makeup water to the cooling towers. Potentially contaminated water will be tested to determine an appropriate destination for reuse. Depending on the water quality, it may be used for cooling tower makeup, used for gasifier slurry water makeup, or disposed in one of the zero liquid discharge (ZLD) systems.

- Storm water runoff from nonprocess areas but within the main plant area will be routed to lined retention basins.

- Storm water runoff from nonprocess areas outside the main plant process areas but within the Project Site should be relatively clean. Runoff from these areas will be separately collected in retention basins located throughout the Project Site.

- Noncontact storm water runoff outside the power block and process areas will be routed to storm water retention basins. After solids have settled and water is determined to be suitable for reuse, storm water will be filtered for suspended solids removal before being used as cooling tower makeup water. If this collected storm water is determined to be unsuitable for cooling tower use, then it will be reused in the slurry preparation area or disposed of in one of the ZLD systems.

- Storm water that may be contaminated with oil will be separately collected and routed to an oil/water separator. Recovered waste oil from the separator will be disposed off site in accordance with applicable laws, ordinances, regulations, and standards (LORS). The separated water will be reused or disposed as described above.

- Storm water runoff in the Acid Gas Removal (AGR) Unit will be collected in a separate lined, dedicated AGR storm water retention basin. The AGR unit collection system is isolated to contain any potentially contaminated water that could result in the unlikely event of a methanol spill.

- Storm water runoff from chemical and oil storage areas will be held within the associated secondary containment. Storm water held in these areas will first be tested. If it is acceptable for cooling water makeup, then it will be routed to the retention basin. Oily storm water will be routed through an oil/water separator.

- Storm water within the process plant area where solids are present (e.g., coal, petcoke, or gasification solids) will be collected and conveyed to the solids handling water collection facility. The collection facility will be constructed of concrete and will provide for mobile equipment access to remove accumulated solids. Water that accumulates within collection facility will be processed in the ZLD system at the wastewater treatment plant.

- Storm water from remote solids handling areas, such as the feedstock unloading and the crusher station, will be collected in lined retention basins for settlement, testing, reuse, and/or treatment as appropriate.

The storm water management system will be designed in accordance with the U.S. Environment Protection Agency's (U.S. EPA's) guidance document entitled "Storm Water Management for Construction Activities – Developing Pollution Prevention Plans and Best Management Practices" (U.S. EPA, 1992), the California Storm Water Best Management Practices Handbook, the National Pollution Discharge Elimination System Industrial General Permit Requirements, and 2003 Construction General Permit requirements.

Preliminary Drainage Calculations have been prepared and are included as Revised Appendix B. These preliminary calculations consider a tributary drainage area of 453 acres, most of which will be disturbed during Project construction. A Summary of Preliminary Drainage Calculations is presented in Table 1. Figure B-1 in Appendix B identifies the drainage subareas used in the preliminary drainage calculations for the operation phase and for the construction phase.

Table 1
Summary of Preliminary Drainage Calculations

Total tributary area	453 acres					
Percentage impervious area before construction	3%					
Percentage impervious area after construction	29%					
Developed total volume of on-site storm water storage	74.7 ac-ft					
Construction phase total volume of on-site storm water storage	36.2 ac-ft					
Storm water Volumes for Each Project Phase and Storm Event						
Condition	**10-Year**		**50-Year**		**100-Year**	
	Hydrograph Volume (ac-ft)	**Ret. Basin Storage (Max) (ac-ft)**	**Hydrograph Volume (ac-ft)**	**Ret. Basin Storage (Max) (ac-ft)**	**Hydrograph Volume (ac-ft)**	**Ret. Basin Storage (Max) (ac-ft)**
Existing Conditions	21.0	N/A	44.2	N/A	55.5	N/A
Developed Conditions	30.9	25.8	51.5	46.4	59.8	54.7
Construction Phase Conditions	N/A	N/A	N/A	N/A	11.6	6.8

Source: Calculations from FLUOR, 2012 (included in this document as Appendix B)

Notes:

ac-ft = acre-feet
cfs = cubic feet per second
N/A = not applicable

CLEARING AND GRADING PLANS

Figure 6 depicts the preliminary grading concept developed for the Project Site. Grading associated with the Project linear facilities will be developed as Project design is advanced prior to construction; however, as noted below, construction of the linear facilities will not result in a change in surface elevations.

CLEARING AND GRADING NARRATIVE

The information provided in this section is preliminary and will be updated and expanded as the Project design is advanced prior to the start of construction for the Project. The Project Site will require earthwork movement to construct the various HECA process areas and associated facilities. On-site construction activities include clearing and grubbing, grading, layout of equipment, delivery and handling of materials and supplies, and Project construction and testing operations.

For areas where earthwork will be executed, materials suitable for compaction will be stockpiled in designated on-site locations. Materials not suitable for compaction will be stored in separate stockpiles and reused on the site, as appropriate.

If any contaminated materials are encountered during excavation, they will be disposed of in accordance with applicable ordinances. Only licensed, commercial fill or inspected and approved on-site soil suitable for fill will be used for the Project.

Construction of the Project linear facilities will not result in a change in surface elevations and un-improved disturbed areas will be returned to preconstruction conditions.

Project Site

The Project Site occurs in an area of relatively flat topography. Site grading will occur as necessary to form level building pads for major process units as shown on the Grading Plan. All existing irrigation ditches within the Project Site will be abandoned and filled in to meet grade. The irrigation ditches serve the current agricultural uses on the property and will no longer be needed once the Project Site is developed. The smaller irrigation ditches on the Project Site that serve the individual crop fields will also be abandoned and filled where not required for crop irrigation.

It is expected that land disturbances related to development activities will be conducted on the 453-acre Project Site, which includes all temporary construction facilities. Excavation work will consist of the removal, storage, and/or disposal of earth, sand, gravel, vegetation, organic matter, loose rock, boulders, and debris as necessary for construction. Materials suitable for backfill will be stockpiled at designated locations using proper erosion protection methods.

Areas to be backfilled will be prepared by excavating unsuitable material and rocks. The bottom of all excavation areas will be examined for loose or soft areas. If observed, these areas will be excavated fully too competent material and backfilled with suitable material and compacted to required bottom of excavation elevation.

Project Linear Facilities

Electrical Transmission Line. Construction and installation of the electrical transmission line will follow a sequence similar to that of underground facilities, with trench excavation being replaced by augering of holes to facilitate placement of the reinforced concrete foundations for the tubular-steel transmission structures, followed by backfilling and compaction. Grade cuts will be restored to their original contours, and affected areas will be restored to their original state to minimize the potential for erosion. To the extent possible, the material excavated from trenches and auger holes will be used to backfill around the foundations and in the trenches. Additional excess material that cannot be reused along the easement corridor will be transported to another reuse area or disposed of at an off-site landfill facility because it will be susceptible to increased erosion if left in-place. During construction and installation, the soil within the alignment for the linear facilities may become more susceptible to erosion. The extent of this construction-related impact on soils and agricultural lands, however, will be temporary, and appropriate BMPs will be implemented to minimize potential impacts. With the implementation of mitigation measures, no significant impacts are anticipated to native soil, receiving water bodies, or area agricultural lands at or near linear facilities.

Transmission line installation will require a construction rights-of-way of 100 feet. Temporary ground disturbance within the rights-of-way could be as much as about 7 acres. At the end of the construction, the total permanent disturbance will be less than 1 acre.

Process Water, Potable Water, Natural Gas and Carbon Dioxide Pipelines. Construction of the interconnection pipelines will consist primarily of crews performing the following typical pipeline construction activities: hauling and stringing of the pipe along the route; welding; radiographic inspection; coating of the pipe welds; trenching; lowering of the pipe into the trench; backfill of the trench; hydrostatic testing of the pipeline; purging the pipeline; and cleanup and restoration of construction areas. Grade cuts will be restored to their original contours, and affected areas will be restored to their original state so as to minimize erosion. Generally, the tops of all subsurface linear pipelines will be approximately 5 feet below grade, except at HDD crossings. The pipeline trench depth will extend approximately 1 foot below the bottom of pipeline.

Pipeline installation will require construction rights-of-way of 50 feet to 10 feet, depending on the pipeline. Temporary ground disturbance within the rights-of-way could be as much as about 170 acres. At the end of the construction, the total permanent disturbance will be less than 1 acre.

When the proposed routes (Figures 2 and 3) cross Interstate 5, Highway 58 and the adjacent RailAmerica railroad line, the East Side Canal, California Aqueduct, Kern River Flood Control Channel, and the West Side Canal, the pipelines may be installed under these facilities using HDD. The depth of HDD under the water bodies will comply with all applicable federal and state regulations.

The California Department of Water Resources (DWR) "Encroachment Permit Guidelines June 2005" spells out specific requirements regarding the use HDD. The principal requirements include but are not limited to the following:

- A site-specific geotechnical report must be submitted to the DWR with the Encroachment Permit application.
- Pipe sleeves are required with any pipeline carrying hazardous materials or pollutants.
- The minimum separation between the bottom of the aqueduct channel and the top of pipe is 25 feet; further separation may be required, depending on the actual pipe diameter.

- Drawings submitted with the Encroachment Permit Application must include the following for buried pipelines (as a minimum):

  - Aqueduct mileposts at each crossing, pipe size, location, and type of material transported
  - Maximum operating pressure, type of pipe and pipe joints, pipe wall thickness, maximum test pressure, and description of test procedures
  - Type of sleeve/casing including diameter, joints, and wall thickness
  - Protection coatings and a description of control measures
  - Method employed to accommodate pipeline expansion and contraction
  - Thrust block location and details
  - Pipe line coatings and corrosion control measures
  - Location of shutoff valves on each side of the crossing
  - List of applicable design codes
  - Location, including depth of the buried aqueduct communication and control cables
  - Identification of existing utility easements or encroachments in the immediate vicinity of the proposed crossing

The HDD method includes a drilling rig that will bore a horizontal hole under the water crossings. The HDD could extend up to 1 mile, but much shorter distances are anticipated. The temporary disturbance area would be approximately 120 feet by 100 feet for each HDD entry pit; and approximately 75 feet by 100 feet for each HDD exit pit (Stantec, 2012). The depth of entry/exit pits will be similar to that of the normal pipeline trench depth. The maximum depth for linear installations at proposed HDD crossings is 100 feet.

BMPs for HDD will include silt fencing around the drill sites, energy dissipation devices for discharging water from hydrostatic testing of the pipeline, selecting drilling fluids for environmental compatibility, and removing spent fluids from the areas immediately adjacent to the water bodies for safe disposal and to prevent contamination. In addition, soil erosion control measures will be implemented to prevent runoff and impacts to water quality.

When the proposed pipeline route crosses other water bodies (e.g., irrigation canals), an assessment of the site conditions will be performed to determine which crossing method to use (i.e., conventional open cut or HDD). The assessment will consider the canal-specific hydrologic conditions at the time of crossing, along with the landscape terrain features. If the open cut method is selected, the assessment will determine which variation of conventional open cut method would be used. When feasible, crossing of the canals will be performed when the canal is dry using dry-ditch techniques. If water is present at the time of crossing a canal, sites will be evaluated on a case-by-case basis to determine if conventional open-cut, flume variation of open-cut, or dam and pump variation of open-cut will be used.

All extra work areas will be located at least 50 feet away from the water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. The Project will limit the amount of vegetation cleared between the waterbody and the work area and minimize the amount of extra work space near canal crossings to the greatest extent possible. Crossings will be aligned as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions allow.

Canals and banks will be restored to preconstruction contours or to a stable angle of repose.

Industrial Railroad Spur. Construction and installation of the industrial railroad spur will follow a typical method used on similar rail projects. Once the right-of-way is cleared, work will consist of clearing and grubbing, rough grading, tract embankment fill, drainage ditches, drainage culverts, road crossings, ballast placement, track placement, crossing signals/signs. Some existing utility relocation work is anticipated which will be performed during rough grading. It is planned that the natural gas line

linear construction will follow the railroad spur linear alignment, offset 25 feet from the centerline of the railroad spur tracks. The proposed route crosses one existing irrigation canal (East Side Canal) managed by BVWSD. HECA will work with BVWSD to engineer an appropriate canal crossing and secure the appropriate approvals. Potential impacts to non-wetland waters of the U.S. would qualify for authorization under the Nationwide Permit (NWP) 12 for Utility Line Activities and NWP 33 for Temporary Construction Access. During construction and installation, the soil within the alignment may become more susceptible to erosion. The extent of this construction-related impact on soils and agricultural lands, however, will be temporary, and appropriate BMPs will be implemented to minimize potential impacts. With the implementation of mitigation measures, no significant impacts are anticipated to native soil, receiving water bodies, or area agricultural lands at or near linear facilities.

The railroad spur installation will require a construction rights-of-way of 75 feet. Temporary ground disturbance within the rights-of-way could be as much as about 52 acres. At the end of the construction, the total permanent disturbance will be approximately 39 acres and less than 0.1 acres of permanent impact to waters of the U.S.

Construction Laydown/Parking Areas

Construction laydown and parking areas will be graded (as necessary) to support the storage of equipment and materials and craft parking. Soil stabilization measures will be implemented as appropriate for dust and erosion control purposes. Laydown areas will be fenced around their perimeter. Gates will be provided for access control. At the end of construction, these areas will be cleaned up and restored to their preconstruction conditions.

BEST MANAGEMENT PRACTICES (BMP'S)

The California Storm water Quality Association's (CASQA's) Construction Handbook will used for selecting and implementing appropriate erosion control measures that will eliminate or reduce the discharge of pollutants from the site. The Construction Handbook contains BMP fact sheets describing erosion, sediment, wind, and vehicle tracking control practices that protect the soil surface, and trap soil particles that have been detached by rainfall, flowing water, wind, or construction operations. Figure 8 shows the placement of the BMPs that will be used during Project Site construction.

Discussed below in the narrative is a list and description of potential BMPs to be used during construction of the Project Site, linear facilities, and associated Project components. Prior to construction, a construction SWPPP will be prepared. The SWPPP will include details for all BMPs. Updated BMP maps will be included in the SWPPP. As part of the SWPPP, a current set of the BMP drawings will be maintained in the Project construction trailer and updated as needed to reflect modified or new BMPs that are being implemented on site. Plans depicting specific details of BMPs to be used during construction will be developed and provided as the Project design is advanced prior to construction.

BEST MANAGEMENT PRACTICES NARRATIVE

The Project's Key Best Management Practices Implementation Dates are provided in Table 2. An implementation and maintenance schedule for the drainage, erosion, and sediment control methods and practices that will be used at the Project Site and linear facilities are described in the following section. Specific schedule details will be developed and provided as Project design is advanced prior to construction.

Table 2
Key Best Management Practices Implementation Dates

Start of Rainy Season	October 15
End of Rainy Season	April 15

Source: CASQA 2003a, 2003b

BMP Implementation and Maintenance Schedule

The following discussion summarizes the BMPs proposed to be implemented at the Project Site during construction and post-construction phases of the Project. These BMPs were selected from the California Storm water BMP Handbook Construction (CASQA, 2003a).

Soil Stabilization (Erosion Control)

Soil stabilization, also referred to as erosion control, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in storm water runoff. The Project will implement the following practices for effective temporary and final soil stabilization:

Proposed BMPs

EC-1 Scheduling
EC-2 Preservation of existing vegetation
EC-6 Straw mulch
EC-7 Geotextiles and mats
EC-9 Earth dikes and drainage swales

Implementation of Soil Stabilization BMPs

- The Project will monitor weather using National Weather Service reports to track conditions and alert crews to the onset of rainfall events.
- Disturbed soil areas will be stabilized with temporary soil stabilization or with permanent erosion control as soon as possible after grading or construction is complete.
- During the rainy season, disturbed areas will be stabilized with temporary or permanent soil stabilization (erosion control) before rain events.
- During the rainy season, disturbed areas that are substantially complete will be stabilized with permanent soil stabilization (erosion control) and vegetation (if within seeding window for seed establishment).
- During the rainy season, prior to forecast storm events, temporary soil stabilization BMPs will be deployed and inspected.
- During the nonrainy season, the Project schedule will sequence construction activities with the installation of both soil stabilization and sediment control measures. The construction schedule will be arranged as much as practicable to leave existing vegetation undisturbed until immediately prior to grading.

Sediment Control

Sediment controls are structural measures that are intended to complement and enhance the selected soil stabilization (erosion control) measures and reduce sediment discharges from construction areas. The Project will implement the following practices for effective sediment control:

Proposed BMPs

SE-1 Silt fence
SE-4 Check dams
SE-5 Fiber rolls
SE-7 Street sweeping and vacuuming
SE-8 Sandbag barrier

Implementation of Sediment Controls

- During the rainy season, temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas, at the toe of slopes at all times.
- During the nonrainy season, temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas before rain events.
- During the nonrainy season, in the event of a predicted storm, the following temporary sediment control materials will be maintained on site: silt fence materials, sandbags, and fiber rolls.

Tracking Control

The following BMPs have been selected to reduce sediment tracking from the Project Site onto private or public roads during construction:

Proposed BMPs

SE-7 Street sweeping and vacuuming
TR-1 Stabilized construction entrance/exit
TR-2 Stabilized construction roadway
TR-3 Entrance/outlet tire wash

Wind Erosion Control

The following BMP has been selected to control dust from the construction site:

Proposed BMP

WE-1 Wind erosion control

Project Linear Facilities

The following BMPs have been selected for construction of the linear facilities:

- Avoid sensitive habitats and species during construction by developing construction exclusion zones and silt fencing in sensitive areas.
  - In general, disturbance to existing grades and vegetation will be limited to the actual site of the linear alignments, which will be generally 15-foot construction corridor. Where appropriate, this corridor may be reduced to 5 feet to avoid environmental resources and/or minimize traffic disruption. Information about environmentally sensitive areas will be shown on contract plans and discussed in the Special Provisions.
  - Environmentally sensitive area provisions could include, but are not limited to, the use of temporary orange fencing to delineate the proposed limit of work in areas adjacent to sensitive resources, or to delineate and exclude sensitive resources from potential construction impacts.
  - Contractor encroachment into environmentally sensitive areas will be restricted (including the staging/operation of heavy equipment or casting of excavation materials). Provisions for environmentally sensitive areas will be implemented as a first order of work, and will remain in place until all construction activities are complete. This includes any nest sites identified during preconstruction surveys.
  - Placement of all roads, staging areas, and other facilities will avoid disturbance to wetlands and other sensitive areas of habitat, except where unavoidable impacts have been identified and mitigation has been proposed.
  - Existing ingress or egress points will be used. Equipment parking, Project access, supply logistics, equipment maintenance, and other Project-related activities will occur at a designated staging area.
  - Following completion of the work, the contours of the area will be returned to preconstruction conditions or better.
- Provide worker environmental awareness training for all construction personnel.
  - Training will include the identification of any special-status biological resources and measures required to minimize Project impacts during construction and operation.
- General avoidance of wetland/stream impacts
  - The launching and receiving pits for stream and drainage channel crossings will be located at least 10 feet back from the stream/drainage channel. No work will be conducted within the California Aqueduct, the Kern River Flood Control Channel, and/or the West Side/Outlet Canal right-of-ways without prior approval.
  - Regional Water Quality Control Board-approved physical barriers adequate to prevent the flow or discharge of sediment into water systems will be constructed and maintained between working areas and streams, lakes, and wetlands. Erosion control and sediment retention devices (e.g., well-anchored sandbag cofferdams, straw bales, or silt fences) will be incorporated into the Project design and implemented at the time of construction. These

devices will be in place during construction activities, and afterwards if necessary, to minimize sediment impacts to the wetlands. These devices will be placed at all locations where sediment input is likely.

  - An emergency response plan will be prepared and submitted to appropriate agencies prior to the start of construction. The plan will identify actions that will be taken in the event of a spill of petroleum products or other material harmful to aquatic or plant life, and the emergency response materials that will be kept at the site to allow the rapid containment and cleanup of any spilled material.

- Revegetation and restoration of disturbed areas

  - Vegetation disturbed during the installation of the linear facilities will be replanted with appropriate native species.

  - The topography will be restored after proposed construction activities have been completed.

- Measures to avoid and minimize potential for frac-outs (only possible with the HDD pipeline installation method) will include:

  - All tunneling activities will be conducted outside of wetland and riparian areas.

  - All work will be performed during dry months.

  - Certified weed-free straw barriers and silt fences will be installed between the work area and any potential jurisdictional wetlands, if topography is such that runoff from the work area could enter any nearby potential jurisdictional wetlands.

  - A Frac-Out Contingency Plan will be prepared and implemented to minimize potential for frac-out during HDD. This plan will describe BMPs for dealing with a frac-out should one occur.

  - An on-call vacuum truck will be maintained in case a spill, seep, or frac-out occurs.

  - The HDD operation will be designed, preplanned, and directed in such a way as to minimize the risk of spills of all types. Appropriate controls will be established to quickly seal any leakage that may occur and prevent spills from traveling outside the work area.

  - Biological monitor(s) will continuously monitor the HDD operation to ensure adequate protection controls have been installed. All field personnel will be briefed on their responsibility for timely reporting of frac-out releases to the monitor on site.

  - If a frac-out or spill into the drainage channel occurs, CDFG and either West Kern Water District or BVWSD (depending on the location of the incident) will be contacted immediately. Work activities will cease immediately, and will not resume until the jurisdictional agency determines that no facilities or biological resources are at risk.

  - Any sediment, including natural substrate, that enters the channel in a frac-out situation will be contained and removed from the channel as part of the cleanup procedure.

- Capping all open pipes
  - Capping open pipes at the end of each day during construction will reduce the potential for wildlife to enter a pipe and become trapped.

Nonstorm water Control

The following BMPs have been selected as nonstorm water controls:

Proposed BMPs

NS-1 Water conservation practices
NS-3 Paving and grinding operations
NS-6 Illicit connection/illegal discharge detection and reporting
NS-8 Vehicle and equipment cleaning
NS-9 Vehicle and equipment fueling
NS-10 Vehicle and equipment maintenance
NS-11 Pile driving operations
NS-12 Concrete curing
NS-13 Concrete finishing
NS-14 Material over water
NS-15 Demolition adjacent to water
WM-8 Concrete waste management

Waste Management and Materials Pollution Control

The following BMPs have been selected as waste management and material pollution control:

Proposed BMPs

WM-1 Material delivery and storage
WM-2 Material use
WM-3 Stockpile management
WM-4 Spill prevention and control
WM-5 Solid waste management
WM-6 Hazardous waste management
WM-8 Concrete waste management

Petroleum Products. Construction equipment will require use of diesel fuel and oil on a regular basis. While a potential exists for spills or leaks, all on-site vehicles will be monitored for leaks and receive regular preventive maintenance to ensure proper operation and reduce the chance of leakage. To further reduce the possibility of spills, no "topping off" of fuel tanks will be allowed.

Petroleum products will be stored in clearly labeled and tightly sealed containers or tanks. Any asphalt used on-site will be applied according to the manufacturer's recommendations. Any soil impacted by fuel or oil spills will be removed and disposed of by the Contractor at an approved disposal site. It will be the Contractor's responsibility to ensure that secondary containment around fuel/oil tanks (stationary or mobile) will meet the minimum requirements of the U.S. EPA 40 Code of Federal Regulations Part 112 with regard to secondary containment or more stringent state requirements, if applicable. Any spills will be contained and cleaned up immediately.

Sanitary Wastes. A licensed sanitary waste management contractor will collect all construction or temporary sanitary wastes from the portable units. The units will be maintained on a regular basis. Portable units will be placed on a flat area at least 50 feet from streets or drain inlets. Portable units will be anchored to prevent blowing or tipping over, and all leaks or spills will be reported immediately (sampling may be required).

Hazardous Wastes. Potentially hazardous waste associated with construction of the Project will be limited to small quantities of liquids and solids such as lubricating oils, acids for equipment cleanup, concrete curing compounds, and waste paint. These wastes are typical of industrial construction activities and will be placed in containers on-site and disposed in accordance with applicable ordinances and with the manufacturer's recommendations.

Hazardous wastes will be either recycled or disposed of in a licensed Class I disposal facility, as appropriate. Waste oil and used oil filters will be recycled if the maintenance activities will take place on-site. Waste generated during each chemical cleaning operation will be temporarily stored on-site in portable tanks and disposed off-site by the chemical cleaning contractor at an appropriate disposal facility. Site personnel will be instructed regarding these procedures and the Site Manager will be responsible for implementing these practices.

To prevent contact of hazardous wastes with storm water runoff, secondary containment such as curbs and berms will be provided. As much as possible, all materials will be kept in a dry covered area.

Paints. All containers will be tightly sealed and properly stored to prevent leaks or spills. Excess paint will not be discharged to the storm water system. Unused paints will be disposed in labeled original containers according to applicable local, state, and federal laws and regulations. Spray painting will not occur on windy or rainy days, and a drop cloth will be used to collect and dispose of drips associated with painting activities. All paints will be mixed indoors, in a containment area. If using water based paints, equipment will be cleaned in a sink that is connected to the sanitary sewer.

Concrete Trucks. *C*oncrete trucks will not be allowed to discharge surplus concrete and drum wash at the site, unless these materials are fully contained in an engineered structure that can contain all free liquid until dry. Dried concrete shall then be removed and disposed of at an off-site location. Alternatively, concrete washout will be taken off site for disposal by the concrete contractor. No surplus concrete or drum wash water will be disposed of onto the ground surface.

Waste Materials. All construction waste material, trash, and construction debris will be collected and stored in a metal dumpster, leased from a licensed solid waste management contractor. The dumpster will meet all local and state solid waste management regulations. The dumpster will be emptied a minimum of twice per week or more often if necessary, and the trash will be hauled to the local dump. No construction waste will be buried on-site. All site personnel will be instructed regarding the correct procedure for waste disposal. The Site Manager will be responsible for seeing that these procedures are followed. All dumpsters will be covered, where possible.

Allowable Nonstorm water Discharges. The following sources of nonstorm water discharges may be combined with storm water discharges from Project construction activities:

- Pavement wash waters and dust control water not containing toxic or hazardous substances
- Uncontaminated dewatering discharges
- Firefighting waters
- Vegetation watering
- Potable or spring water discharges

Good Housekeeping. Good housekeeping practices are designed to maintain a clean and orderly work environment. The good housekeeping practices listed below will be followed to reduce the risk of potential pollutants entering storm water discharges. All construction personnel will be responsible for monitoring and maintaining housekeeping tasks and reporting potential problems to the Site Manager:

- Store only enough products required for doing the job.
- Store all materials in a neat and orderly manner in the appropriate containers. Materials that may adversely impact storm water, such as paint, oils, greases, and sealers, will be stored in covered areas such as temporary/permanent buildings or trailers, in accordance with the SWPPP.
- Keep products in the original container with the original manufacturer's label.
- Do not mix products unless recommended by the manufacturer.
- Use all of a product before disposing of the container.
- Use and dispose of products according to the Site Manager's direction or manufacturer's recommendations.
- Perform regular inspections of the storm water system and the material storage areas.
- When and where appropriate, use posters, bulletin boards, or meetings to remind and inform construction personnel of required procedures.
- Preventive maintenance includes regular inspection and maintenance of structural storm water controls (e.g., catch basins and oil water separators) as well as other facility equipment and systems.

Storage areas for hazardous materials such as oils, greases, paints, fuels, and chemicals will be provided with secondary containment to ensure that spills in these areas do not reach storm water. All hazardous chemical storage areas will be surrounded by curbs or dikes to contain the chemicals in the event of leaks or spills. The Contractor will establish contingencies for the proper disposal of contaminated soils (use of licensed hauler, approved landfill) early in the construction period. Secondary containment will be designed to hold the entire contents of the largest single storage container plus rainfall from a 50-year, 24-hour storm for all outdoor storage areas. Curbs and dikes will be provided around all chemical storage areas, hazardous waste products, areas with possibility of oil spill, and washout areas.

Spills and leaks are one of the largest potential sources of storm water pollutants at industrial facilities. Chemicals will be stored in chemical storage facilities appropriately designed for their individual characteristics. Bulk chemicals will be stored outdoors in aboveground storage tanks. Other chemicals will be stored and used in their delivery containers. All hazardous chemical storage areas will be surrounded by curbs or dikes to contain the chemicals in the event of leaks or spills. Secondary containment will be sized to hold the entire contents of the largest single storage tank. All drains and vent piping for volatile chemicals will be trapped and isolated from other drains. Containment areas for bulk storage tanks will not be drained. Any chemical spills in these areas will be removed with portable equipment and reused or properly disposed. It is anticipated that all substances will be applied/dispensed at manufacturer's recommendations. In addition to the housekeeping and hazardous materials storage procedures described above, spill prevention and cleanup practices will be as follows:

- The Site Manager or appointee is responsible for informing construction personnel of the manufacturer's recommended spill cleanup methods, and the location of that information and cleanup supplies.

- Materials and equipment for the cleanup of a relatively small spill will be kept in the materials storage area. These facilities may include brooms, rags, gloves, shovels, goggles, sand, sawdust, absorbent, plastic or metal trash containers, and protective clothing.

- All containers will be labeled, tightly sealed, and stacked or stored neatly and securely.

Spill response procedures will be as follows:

Step 1: Upon discovery of a spill, stop the source of the spill.

Step 2: Cease all spill material transfer until the release is stopped and waste removed from the spill site.

Step 3: Initiate containment to prevent spill from reaching state waters.

Step 4: Notify Supervisor and the Site Manager of the spill.

Step 5: The Site Manager will immediately notify the HECA emergency coordinator, and coordinate further cleanup activities

Step 6: Any significant spill of hazardous material will be reported to the appropriate state and/or local agencies by HECA personnel or qualified contractors. See Table 3 for Emergency Response Contact List.

Step 7: Submit a Notice of Discharge Form within 7 days of the discharge event.

Step 8: Review the construction storm water pollution prevention plan and amend, if needed. Record a description of the spill, cause, and cleanup measures taken.

Inspection, Maintenance, and Recordkeeping Procedures

Site inspection and facility maintenance are important features of an effective storm water management system. The Contractor's qualified personnel will inspect disturbed areas of the site that have not been stabilized, storage areas exposed to precipitation, all control measures, and site access areas to determine if the control measures and storm water management system are effective in preventing significant impacts to receiving waters.

Inspections will be performed during the nonrainy season once every 2 weeks. Maintenance will be performed as necessary. Inspections will be performed before and after storm events and once each 24-hour period during extended storm events to identify BMP effectiveness and implement repairs or design changes as soon as feasible, depending on field conditions. The discharger will complete an inspection checklist, which will include the following information:

- Inspection date
- Weather conditions
- A description of any inadequate BMPs
- List of observations of all BMPs
- Corrective actions required, including any changes to DESCP
- Inspector name, title, and signature

Erosion and Sediment Controls

The following procedures will be used to maintain erosion and sedimentation controls:

- All control measures will be inspected before and after storm events and once each 24-hour period during extended storm events.
- All measures will be maintained in good working order; if a repair is necessary, that repair will be initiated within 24 hours of the report.
- Sediment will be removed from the silt barriers when it has reached one-third of the height of the barrier.
- Silt barriers will be inspected for depth of accumulated sediment, tears, attachment to posts, and stability on a weekly basis.
- Aggregate-covered areas will be inspected for bare spots and washouts.
- The Site Manager will select individuals to be responsible for inspections, maintenance, repairs, and reporting. The designated inspectors will receive the necessary training from the Site Manager to properly inspect and maintain the controls in good working order.
- An Inspection Form will be completed after each inspection.
- The completed Inspection Forms will be retained on-site.

Table 3
Emergency Response Contact List

Company/Organization Telephone Numbers	
HECA	
Primary Facility Emergency Coordinator	Manager
24-Hour Telephone Number: HECA Dispatch	
Alternate Facility Emergency Coordinator	Principal Engineer
HECA Environmental Specialist	TBD
HECA Media Representative	TBD
HECA Headquarters Telephone Operator	TBD
Other Resources	
3E Company (material safety data sheets by fax)	(800) 451-8346
Chemtrec (emergency chemical information)	(800) 424-9300
Poison Control Center	(800) 662-9886
Federal Agency	
U.S. Coast Guard/National Response Center	(800) 424-8802
State Agencies	
California Office of Emergency Services	(800) 852-7550
California Department of Toxic Substances Control*	(800) 852-7550
California Department of Fish and Game* Central Region Headquarters Office Attn: Julie Vance, Sr. Environmental Scientist (559) 243-4014, x 222	(800) 852-7550
California State Lands Commission	(562) 590-5201
Regional Water Quality Control Board* Central Valley Attn: Doug Patterson, Sr. Water Resource Control Engineer (559) 445-5146	(800) 852-7550
West Kern Water District Attn: J.D. Bramlet, Director of Operations	(661) 763-3151
Kern County Water Agency	(661) 634-1400
Buena Vista Water Storage District Attn: Dave Hampton, Engineer-Manager	(661) 324-1101

Local Contacts	
Kern County Environmental Health Department Matthew Constantine, Director	(661) 862-8700
Fire – Kern County Fire Department	911 or (661) 324-6551
Sheriff – Kern County Sheriff Office	911 or (661) 861-3110
Hospital – Kern Medical Center	911 or (661) 326-2000
Ambulance/Paramedics	911

Note:

* Department of Toxic Substances Control, Regional Water Quality Control Board, and California Department of Fish and Game have requested that emergency notifications to these offices be made through the California Office of Emergency Services 800 number.

Nonstorm water Controls

The following procedures will be used to maintain the nonstorm water controls:

- All control measures will be inspected before and after storm events and once each 24-hour period during extended storm events.
- All measures will be maintained in good working order; if a repair is necessary, that repair will be initiated within 24 hours of the report.
- The designated inspector will visually observe all drainage areas for the presence of unauthorized nonstorm water discharges and their sources.
- If a spill occurs that cannot be cleaned up before the next rain event, or under other circumstances warranting sample collection, the designated inspector will collect storm water samples during the first 2 hours of discharge (even including weekends or holidays). Similarly, if it appears that BMPs have failed or been damaged to the extent that they could result in discharge of pollutants in storm water; and are discharging potentially impacted water, samples should be collected. Sampling would also be required if storm water comes in contact with exposed materials that could potentially contaminate storm water runoff. The samples should be analyzed for visible and nonvisible compounds with the analytical testing suite determined from the specific materials spilled or improperly contained, and for any constituents in the spill that occur in high enough concentrations to cause an impact to water quality.
- The Site Manager will select individuals to be responsible for inspections, maintenance, repairs, and reporting. The designated inspectors will receive the necessary training from the Site Manager to properly inspect and maintain the controls in good working order.
- An Inspection Form will be completed after each inspection.
- The completed Inspection Forms will be retained on-site.

Recordkeeping

Two inspection forms will be completed demonstrating that inspections and maintenance of the control measures are implemented: Erosion and Sedimentation Controls, and Nonstorm water Source Controls. All disturbed areas and materials storage areas require inspection at least every 1 day before and after storm events and once each 24-hour period during extended storm events. After each inspection, the inspector completes an inspection report and retains a copy of the report. Any maintenance required is initiated within 24 hours of the inspection.

A copy of this DESCP and any supporting materials must be maintained at the construction site from the date of California Energy Commission approval to the date of final stabilization. All records and supporting documents will be compiled in an orderly manner, and maintained on-site until final site stabilization is completed.

The generation of reports, as part of the construction process and inspection or amendment procedures, provides accurate records, which can be used to evaluate the effectiveness of this DESCP and document compliance. Changes in design or construction of the storm water management system are documented and included with the DESCP to facilitate review or evaluation.

Post-Construction Storm Water Management

Post-construction BMPs to remove pollutants from storm water and prevent potential spill during the plant operation will be selected from the CASQA's Industrial and Commercial Handbook (CASQA, 2003b). Two types of post-construction BMPs will be used: Source Control BMPs and Treatment BMPs.

1) Source Control BMPs

Source Control BMPs are implemented to prevent contact between storm water and pollution sources. Source Control BMPs are very effective if implemented properly. These BMPs will be selected in accordance with the type of operations and source contaminants. The following is a list of Source BMPs that could be implemented by the Project:

Nonstorm water Management BMPs
SC-10 Nonstorm water discharges
SC-11 Spill prevention, control, and cleanup

Vehicle and Equipment Management BMPs
SC-21 Vehicle and equipment cleaning
SC-22 Vehicle and equipment repair

Material and Waste Management BMPs
SC-30 Outdoor loading/unloading
SC-31 Outdoor liquid container storage
SC-32 Outdoor equipment operations
SC-33 Outdoor storage of raw materials
SC-34 Waste handling and disposal
SC-35 Safer alternative products

Building and Grounds Management BMPs
SC-40 Contaminated or erodible areas
SC-41 Building and grounds maintenance
SC-42 Building repair and construction
SC-43 Parking/storage area maintenance
EC-4 Hydroseeding

After construction, all temporary facilities (i.e., parking areas or laydown areas) outside of the process area will be cleared of all debris and restored to preconstruction conditions. These areas will be treated to prevent erosion as described in SC-40. The treatment will include a combination of two types of vegetation: landscaped and hydroseeding areas. Landscaped areas are irrigated and consist of a variety of vegetation and density that complies with the Kern County ordinance. The type of plants and location for these landscaped areas are detailed in the landscaping plans to be submitted.

Hydroseeding will be used in open areas outside of the process and building areas where no landscaped areas are planned. These drought-resistant plants will consist of perennial/annual native plants that will protect the open areas and berm from wind or surface runoff erosion. These plants are low maintenance after establishment.

For fire protection, a 50-foot-wide strip between any process equipment and the process area will be maintained to be free of vegetation.

2) Treatment Control BMPs

Treatment Control BMPs remove pollutants from the storm water discharge. They are selected based on location of the discharge and the sources of the contaminants. The following is a list of Treatment BMPs that could be implemented by the Project:

Public Domain Control BMPs
TC-11 Infiltration basin
TC-31 Vegetated buffer strip
TC-60 Multiple systems

Water Treatment Plant

The proposed storm drainage system is a ZLD system that will collect and treat all storm water that may come into contact with potential pollutants on-site. Storm water runoff from approximately 107 acres will be collected and conveyed to lined retention basins. Storm water from the process areas will be treated at the water treatment plant and will be reused as make-up water for the cooling water system or process water for maintenance and operation.

Storm water outside of the process, building, and unloading areas would not come into contact with potential pollutants. Storm water runoff from the remaining 346 acres will be conveyed to on-site retention/percolation basins. These basins are shown on Figure B-1 in Appendix B as storm water retention basins 1, 2 and 3.

Storm water System Containments Protection Measures

Spills and leaks are among the largest potential sources of storm water pollutants at industrial facilities. Chemicals will be stored in chemical storage facilities appropriately designed for their individual characteristics. A summary of hazardous materials to be used and stored on site for the plant operations is provided in Table 4, Hazardous Materials Usage and Storage During Operations Based on Title 22 Hazardous Characterization, and Table 5, Hazardous Materials Usage and Storage During Operations Based on Material Properties. These tables present materials that will be used during regular plant operations that may be characterized as hazardous based on Title 22 criteria or on the materials' properties, and indicates which retention basin the material would drain in the case of an spill (refer to Figure B-1in Appendix B for drainage area and retention basin location). All hazardous materials will be properly stored, and spill prevention measures will be implemented to prevent storm water contact with these materials. As indicated in Tables 4 and 5, hazardous materials will be stored in containers or stored in areas that have secondary containment.

Material used to construct the drainage system will be selected to minimize major reactions with potential contaminants that could compromise the structural integrity of the drain system. See reference for chemical resistance guides used.

Table 4
Hazardous Liquid Materials Usage and Storage During Operations
Based on Title 22 Hazardous Characterization[1]

Material	Hazardous Characteristics[2]	Purpose	Storage Location	Maximum Stored	Storage Type	Drainage Area/ Basin/
Sodium Hydroxide (Caustic Solution)	Corrosivity Toxicity	Plant Wastewater ZLD, Sour Water Treatment, Demineralizers, Caustic Scrubber, Desuperheater Contact Condenser	Outdoors	150,000 gallons (5 to 50 wt% NaOH)	Carbon steel ASTs with secondary containment	DA 3 & 9
Spent Caustic	Corrosivity Toxicity	Intermediate storage pending treatment off-site	Outdoors	150,000 gallons	Carbon steel ASTs with secondary containment	DA 3 & 9
Degassed Liquid Sulfur	Ignitability Reactivity	Product	Outdoors	700 tons	One sulfur pit and one AST	DA 7
Methanol	Ignitability Toxicity	AGR solvent make-up	Outdoors	300,000 gallons	One 300,000-gallon AST with secondary containment + 250,000 gallons contained in process vessels of AGR	DA 8
Compressed Gases (Ar, He, H_2)	Ignitability	Laboratory Services	Indoors	Minimal	Cylinders of various volumes	DA 1
Chemical Reagents (acids/bases)	Corrosivity, Reactivity	Laboratory Services	Indoors chemical storage	<5 gallons	Small original containers	DA 1
Flammable/Hazardous Gases (H_2, CO, H_2S), Syngas and Hydrogen-Rich Fuel	Ignitability Toxicity	Intermediate product used for power generation and nitrogen-based product generation	Process Piping	In process quantities only, no storage on site	None	DA 3, 7, 8, & 9
Miscellaneous Industrial Gases (Acetylene, Oxygen, Other Welding Gases, Analyzer Calibration Gases)	Ignitability Toxicity	Maintenance Welding/Instrumentation Calibration	Gas cylinder storage in Shop/Shelters	Minimal	Cylinders of various volumes	DA 3, 7, 8, & 9
Natural Gas	Ignitability	Provides fuel service to consumers	Supply piping only	Utility supply on demand via pipeline	None	DA 3, 7, 8, & 9
Diesel Fuel	Ignitability	Emergency generator/fire water pump fuel	Outdoors	2,000 gallons	ASTs with secondary containment	DA 9
Sulfuric Acid	Corrosivity, Reactivity, Toxicity	Cooling water, Boiler feed water pH control	Outdoors	14,000 gallons	AST with secondary containment	DA 3 & 9
Paint, Thinners Solvents, Adhesives, etc.	Ignitability, Toxicity	Shop/Warehouse	Indoor chemical storage area	<20 gallons	Small original containers	DA 1
Boiler Feedwater Chemicals (e.g., Carbonic Dihydrazide, Morpholine, Cyclohexamine, Sodium Sulfite)	Corrosivity	Boiler feedwater pH/corrosion/ dissolved oxygen/ biocide control	Outdoor chemical storage area	<500 gallons	Small original containers	DA 3 & 9
Hydrogen	Ignitability	STG & CTG generator cooling	Outdoor	30,000 standard cubic feet	Pressurized multi-tube trailer	DA 3 & 9

Table 4
Hazardous Liquid Materials Usage and Storage During Operations
Based on Title 22 Hazardous Characterization[1]

Material	Hazardous Characteristics[2]	Purpose	Storage Location	Maximum Stored	Storage Type	Drainage Area/ Basin/
CTG and HRSG Cleaning Chemicals (e.g., HCl, Citric Acid, EDTA Chelant, Sodium Nitrate)	Toxic, Reactive	HRSG Chemical Cleaning	Stored off site or temporarily on site	Intermittent cleaning requirement/ temp storage only	Small original containers	DA 3 & 9
Anhydrous Ammonia (Liquid)	Irritant, Corrosive to skin, eyes, respiratory tract, and mucus membranes	Intermediate, produced in and used in Manufacturing Complex	Outdoor	Approx. 10,800 tones (Approx 7 day usage)	Double integrity tanks	DA 9
Ammonium Nitrate Solution (75-85wt %)	Irritant	Intermediate, produced in and used in UAN Plant	Outdoor	54 tons	Contained in process vessels	DA 9
Nitric Acid (Approx 60wt %)	Corrosivity, Reactivity, Toxicity	Intermediate, produced in and used in UAN Plant	Outdoor	2,600 tons (3 days)	AST	DA 9
UAN Solution	Corrosivity	Plant Produce	Outdoor	63,000 tons (45 days of production)	AST	DA 9

Source: HECA, Amended AFC, May 2012

Notes:

[1] All numbers are approximate.
[2] Hazardous characteristics identified per California Code of Regulations Title 22 §§ 66261.20 *et seq*., for hazardous wastes.
[3] See Figure B-1 in Appendix B.

% = percent
< = less than
~ = approximately
AGR = acid gas removal
Ar = argon
AST = aboveground storage tank
BFW = boiler feed water
CO = carbon monoxide
CO_2 = carbon dioxide
CTG = combustion turbine generator
EDTA = ethylene diamine tetra-acetic acid
gal = gallons
H_2 = hydrogen
H_2S = hydrogen sulfide
HCl = hydrochloric acid
He = helium
HRSG = heat recovery steam generator
HDPE = high density polyethylene
SCR = selective catalytic reduction
NaOH = sodium hydroxide
NO_X = nitrogen oxide
STG = steam turbine generator
UAN = urea ammonium nitrate
wt% = percent by weight
ZLD = zero liquid discharge

Table 5
Hazardous Materials Usage and Storage During Operations Based on Material Properties[1]

Material	Potential Hazardous Characteristics[2]	Purpose	Storage Location	Maximum Quantity Stored	Storage Type	Drainage Area/Basin
Sodium hypochlorite	Corrosivity, reactivity	Raw water treatment and cooling tower biological control	Outdoor	7,000 gallons	Polyethylene ASTs with secondary containment	DA 3 & 9
Combustion turbine wash chemicals (specialty detergents and surfactants)	Toxic, irritants	Combustion turbine cleaning	Chemicals are contractor-provided and are either not stored on site or are stored only temporarily in a chemical storage area	Intermittent use/cleaning by contractor	Small original containers	DA 3 & 9
Water treatment chemicals	Irritant, mildly toxic	Raw water, demineralized water, and cooling water treatment	Indoor chemical storage area	<500 gallons	Drums or ASTs	DA 9
Oxygen (95%), liquid	Oxidizer	Gasification, SRU	Outdoor	1,200 tons	AST within the ASU	DA 9
Nitrogen[3]	Asphyxiant	Syngas fuel diluent for NO_x control, inert gas	Outdoor	100 tons based on 2.5 hr of feed	AST within the ASU	DA 9
Cooling water chemical additives (e.g., magnesium nitrate, magnesium chloride)	Mild irritant, mildly toxic	Corrosion inhibitor/biocides	Outdoor chemical storage area near each cooling tower	<500 gallons	Small quantities in original containers	DA 9
Diethylene glycol monobutyl ether (industrial cleaner)	Basic compound, toxic, mild irritant	Routine cleaning, degreasing, oxygen pipeline cleaning	Indoor	None	Temporary storage as needed provided by contractor	DA 1
Compressed carbon dioxide gas[3]	Asphyxiant	Generator purging and fire protection	Outdoor	50,000 standard cubic feet for purging	Carbon dioxide, for fire suppression, stored in pressurized cylinders or tank	DA 3, 7, 8, & 9
Propylene glycol	Mild irritant	Heat transfer fluid	Closed loop cooling system	<300 gallons (100 vol. % solution)	4 × ~55 gallon drum or ASTs	DA 9
Propylene glycol	Mild irritant	Heat transfer fluid	Closed loop cooling system In process inventory	25,000 gallons (45 vol. % solution)	Contained in process equipment	DA 9

Table 5

Hazardous Materials Usage and Storage During Operations Based on Material Properties[1] (Continued)

Material	Potential Hazardous Characteristics[2]	Purpose	Storage Location	Maximum Quantity Stored	Storage Type	Drainage Area/ Basin
Sodium bisulfite	Irritant, mildly toxic	Raw water treatment	Indoor chemical storage area	<500 gallons	Drums or ASTs	DA 3 & 9
Sodium phosphate	Irritant, mildly toxic	Raw water treatment, gasification, plant wastewater ZLD	Indoor chemical storage area	1,500 gallons	AST with secondary containment	DA 3 & 9
UAN Solution	Corrosivity	Plant Product	Outdoor	63,000 tons (45 day production)	AST	DA 9

Notes:

[1] All numbers are approximate.
[2] Potential hazardous characteristics based on material properties and potential health hazards associated with those properties.
[3] Nitrogen and carbon dioxide are not hazardous materials but may be asphyxiants under some circumstances.
[4] See Figure B-1 in Appendix B.

% = percent
< = less than
~ = approximately
AGR = acid gas removal
Ar = argon
AST = aboveground storage tank
BFW = boiler feed water
CO = carbon monoxide
CO_2 = carbon dioxide
CTG = combustion turbine generator
EDTA = ethylene diamine tetra-acetic acid
gal = gallons
H_2 = hydrogen
H_2S = hydrogen sulfide
HCl = hydrochloric acid
He = helium
HRSG = heat recovery steam generator
HDPE = high density polyethylene
SCR = selective catalytic reduction
NaOH = sodium hydroxide
NO_X = nitrogen oxide
STG = steam turbine generator
UAN = urea ammonium nitrate
wt% = percent by weight
ZLD = zero liquid discharge

- **Process Area.** The process area is shown as drainage areas 3, 7, and 9 on Figure B-1 in Appendix B. The drainage area is 102 acres. Except for the Chemical Reagents, Paint, Thinners, Solvents, and Adhesives, all hazardous materials listed in Tables 4 and 5, will be stored within the process area in compliance with the California Storm water BMP Handbook Industrial and Commercial. Storm water from the process area will be drained to lined retention basins 3, 7, and 9 as shown on Figure B-1 in Appendix B..

  All surface runoff will be intercepted by a concrete catch basin connected, by an underground network of pipes made of cast iron or carbon steel and high density polyethylene (HDPE), to a retention basin lined with a HDPE liner. Cast iron or carbon steel piping materials are selected for their fire-resistant properties where fire propagation can occur.

An HDPE liner will be used as a secondary containment because it is chemically inert with most hazardous material listed in Tables 4 and 5 (NIBCO, 2010 and Poly-Flex, 2006). In addition, a monitoring system will be installed to detect any potential leaks.

- **AGR Process Area.** The AGR process area is shown as drainage area 8 on page 9 of 32 in Appendix B. The drainage area is 5 acres.

  A separate HDPE-lined retention basin (8 on Figure B-1 in Appendix B) is proposed for the AGR unit as an additional protection measure to segregate and contain surface runoff from a methanol spill.

- **Gasifier Area.** The gasifier area is shown within drainage area 3 and HDPE-lined retention basin 3 on Figure B-1 in Appendix B.

  Storm water and washdown water within the gasifier area will be intercepted by a network of underground piping made of cast iron, carbon steel, or HDPE piping, draining to concrete retention basins (DA 3 and 9 on Figure B-1 in Appendix B). Potential contaminants consist of off specification feedstock and solid waste material from the gasifier process.

- **Admin/Control Room/Warehouse Building Complex.** The admin/control room/warehouse building is shown within drainage area 1 on Figure B-1 in Appendix B.

  Potential pollutants include those commonly associated with vehicles and storage of chemical reagents, paint, thinners, solvents, and adhesives. Contaminants associated with these operations will be contained in localized containment areas. Storm water runoff from this area will be conveyed to a retention basin retention basin 1 is located in the northwestern portion of this area, as shown on Figure B-1 in Appendix B.

- **Feedstock Unloading / Product Loading Area.** Contact storm water and contaminants associated with feedstock unloading and product loading operations will be conveyed, via underground pipeline, to HDPE-lined retention basin 7 as shown on Figure B-1 in Appendix B.

- **Urea and UAN Production, Storage, and Transfer Area.** All urea handling and conveyors are within fully enclosed buildings with insulated roofs and siding equipped with a dust collection system for dust control and fugitive dust emissions. UAN solution is stored in tanks, and then loaded into railcars or tank trucks for product shipment. The drainage from this area is conveyed to HDPE-line retention basin 9 as shown on Figure B-1 in Appendix B.

- **Schedule Maintenance Operation.** Prior to every rainy season (October 15 to April 15), all drainage facilities will be inspected, maintained, and properly repaired. An inspection and monitoring program will be developed to ensure that the drainage system is maintained in good operating condition and without leaks throughout the rainy season.

REFERENCES

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FIGURES

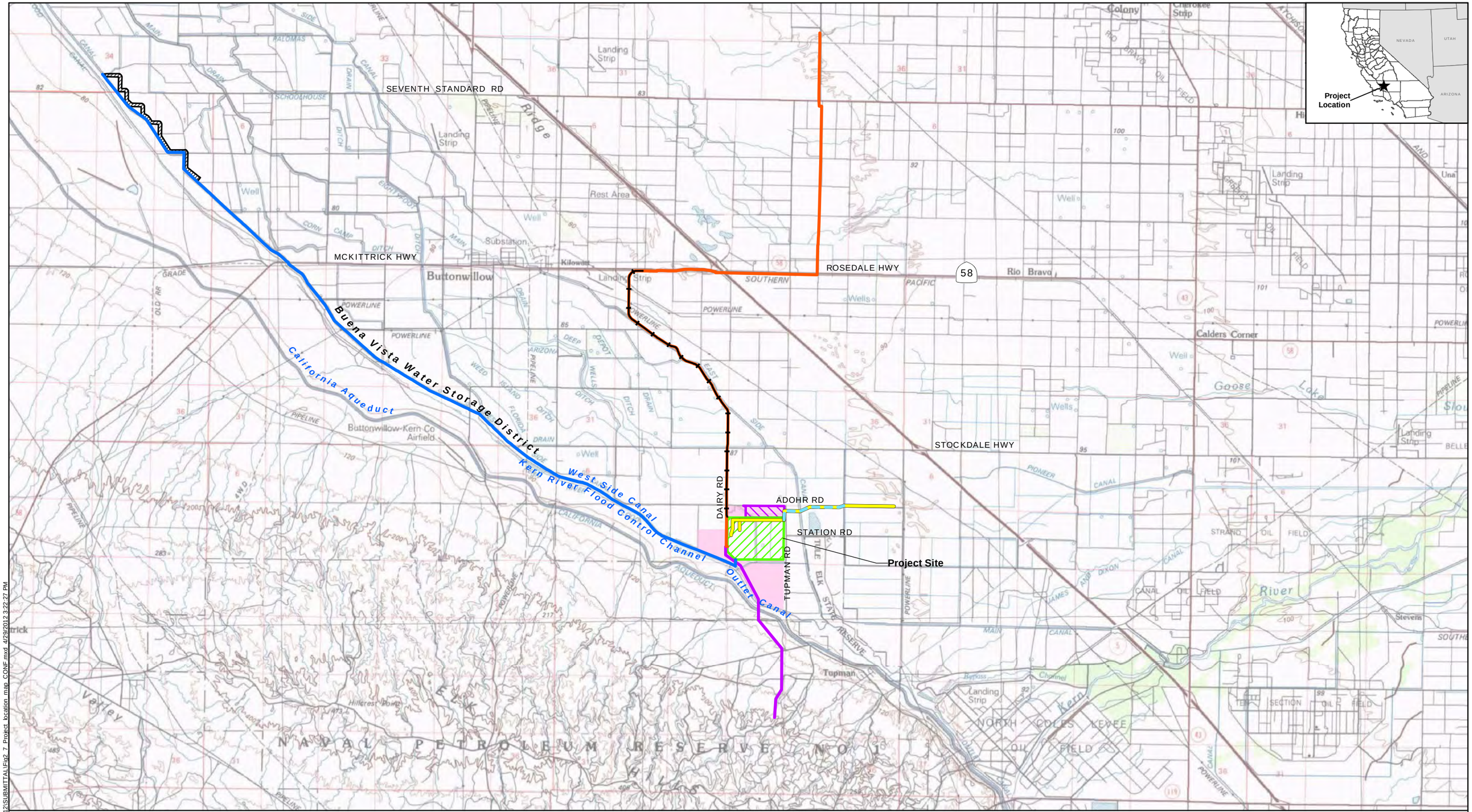
vsa_4/30/12...:U:\GIS\HECA\Projects\HECA_2012\Illustrator_Files\2-1_proj vicinity.ai

PROJECT VICINITY

April 2012
28068052

Hydrogen Energy California (HECA)
Kern County, California

FIGURE 1



PROJECT LOCATION MAP

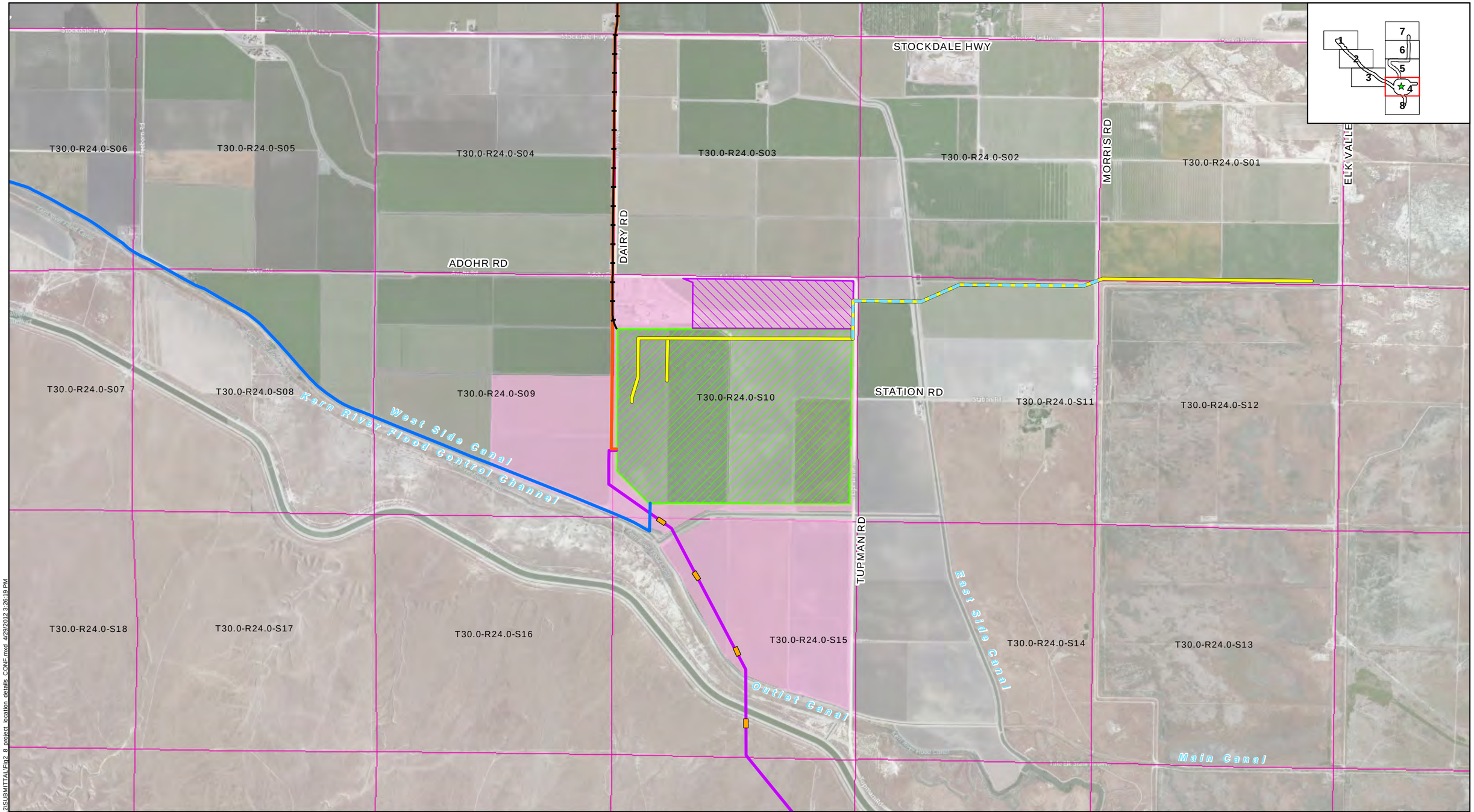
April 2012
28068052

Hydrogen Energy California (HECA)
Kern County, California

FIGURE 2

Source: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. Kern County and State of California (proposed and approved projects).

e:\UG\SHECA\Projects\HECA_2012\SUBMITTAL\Fig2_7_Project_location_map_CONF.mxd 4/29/2012 3:22:27 PM



Project Site
Controlled Area
Construction Staging Area
BVWSD Well Field

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Proposed Natural Gas Valve Station
Rail Laydown Yard
HDD Entry/Exit Pits
Section

Note:
HDD = Horizontal Directional Drilling

N

0 1,000 2,000 Feet

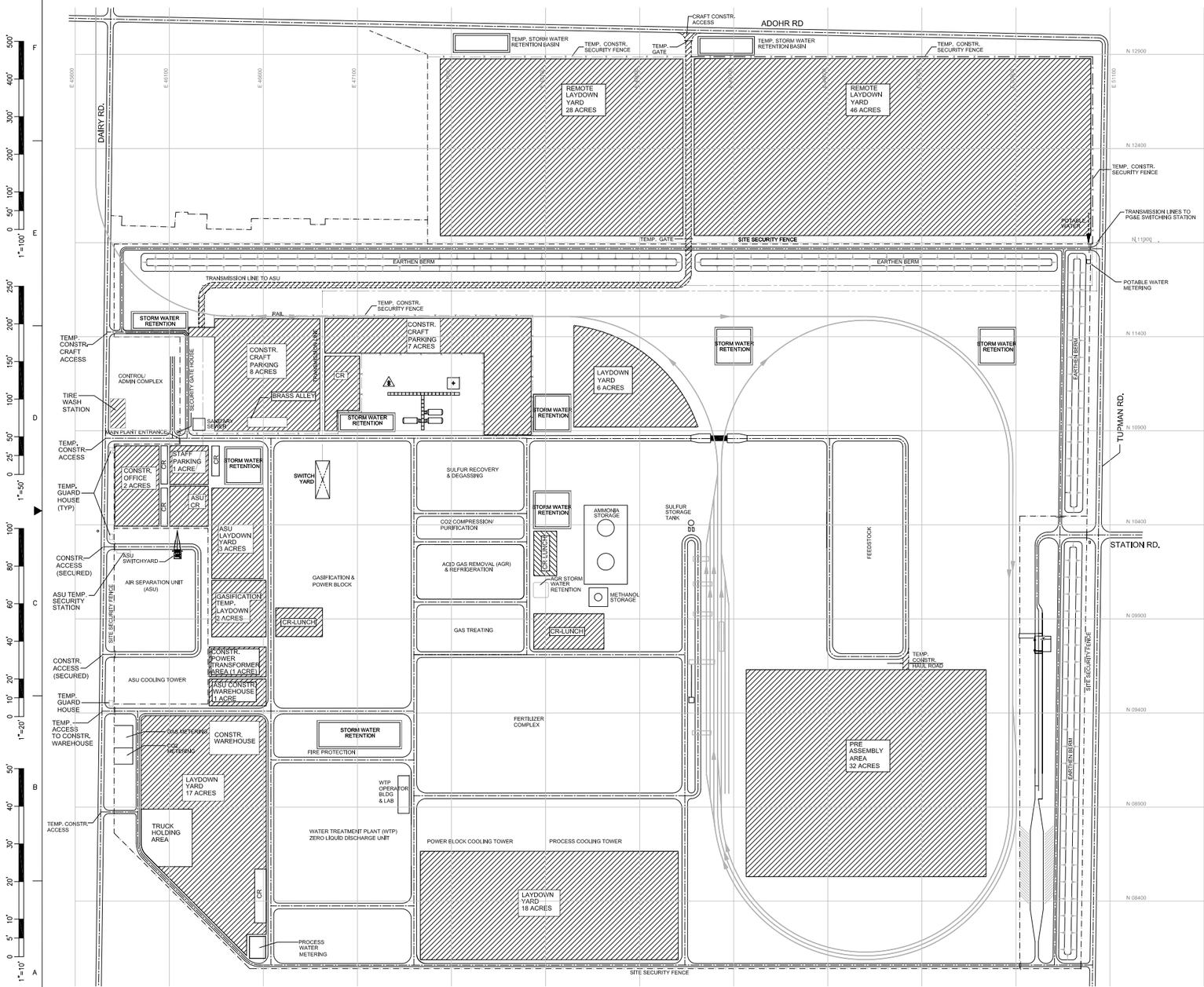
Source: Aerial Imagery, Bing Maps, 2009.

SITE DELINEATION MAP

April 2012
28068052

Hydrogen Energy California (HECA)
Kern County, California

Figure 3



LEGEND

- TEMPORARY FACILITIES AREA
- TRAFFIC FLOW
- FENCE
- TEMPORARY CONSTRUCTION SECURITY FENCE
- TEMPORARY CONSTRUCTION ROAD
- CR–LUNCH — CRAFT CHANGING/LUNCH AREA

AREA ACREAGES

453 AC	OVERALL SITE (INSIDE PERIMETER FENCE)
102 AC	INTERIOR TEMP. CONST. FACIL.
91 AC	EXTERIOR TEMP. CONST. FACIL.

FIGURE 4

SCALE: 1"=200'

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
A	19OCT09	ISSUED FOR CEC AFC	DRM	PMF	BRE
B	14SEP12	ISSUED FOR CEC AMMENDED AFC	DD	RCE	SY

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

CONTRACT	A4UV	
DESIGNED BY	D. MARTINEZ	
CHECKED BY	P. FORTIER	
SUPERVISOR	B. EISENBISE	APP DATE 19OCT09
LEAD ENGR/SPEC	P. FORTIER	APP DATE 19OCT09
ENGR MGR		APP DATE
CLIENT	NA	APP DATE

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HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

PRELIMINARY
TEMPORARY CONSTRUCTION
FACILITIES PLAN

SCALE	DRAWING NUMBER	REV
1"=200'	A4UV-000-10-SK-0012	B
	CAD FILE NAME A4UV-000-10-SK-0012.dwg	

PLOT DATE: 09-18-12 7:52 am Printed By: duo30902 Q:\CAD\210\DWG\Report\A4UV-000-10-SK-0012.dwg

PLANT (STATE PLANE) N

LEGEND

FLOW	FLOW DIRECTION
SLOPE	SURFACE SLOPE DIRECTION
(287)	EXISTING CONTOUR ELEVATION

FIGURE 5

1"=400' 0 200' 400' 800' 1200' 1600'
GRAPHIC SCALE

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
A	19OCT09	ISSUED FOR CEC AFC	DRM	PMF	BRE
B	14SEP12	ISSUED FOR CEC AMMENDED AFC	DD	RCE	SY

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

CONTRACT	A4UV		
DESIGNED BY	D. MARTINEZ		
CHECKED BY	P. FORTIER		
SUPERVISOR	B. EISENBISE	APP DATE	19OCT09
LEAD ENGR/SPEC.	P. FORTIER	APP DATE	19OCT09
ENGR MGR		APP DATE	
CLIENT		APP DATE	

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HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

CIVIL
EXISTING DRAINAGE PLAN

SCALE	DRAWING NUMBER	REV
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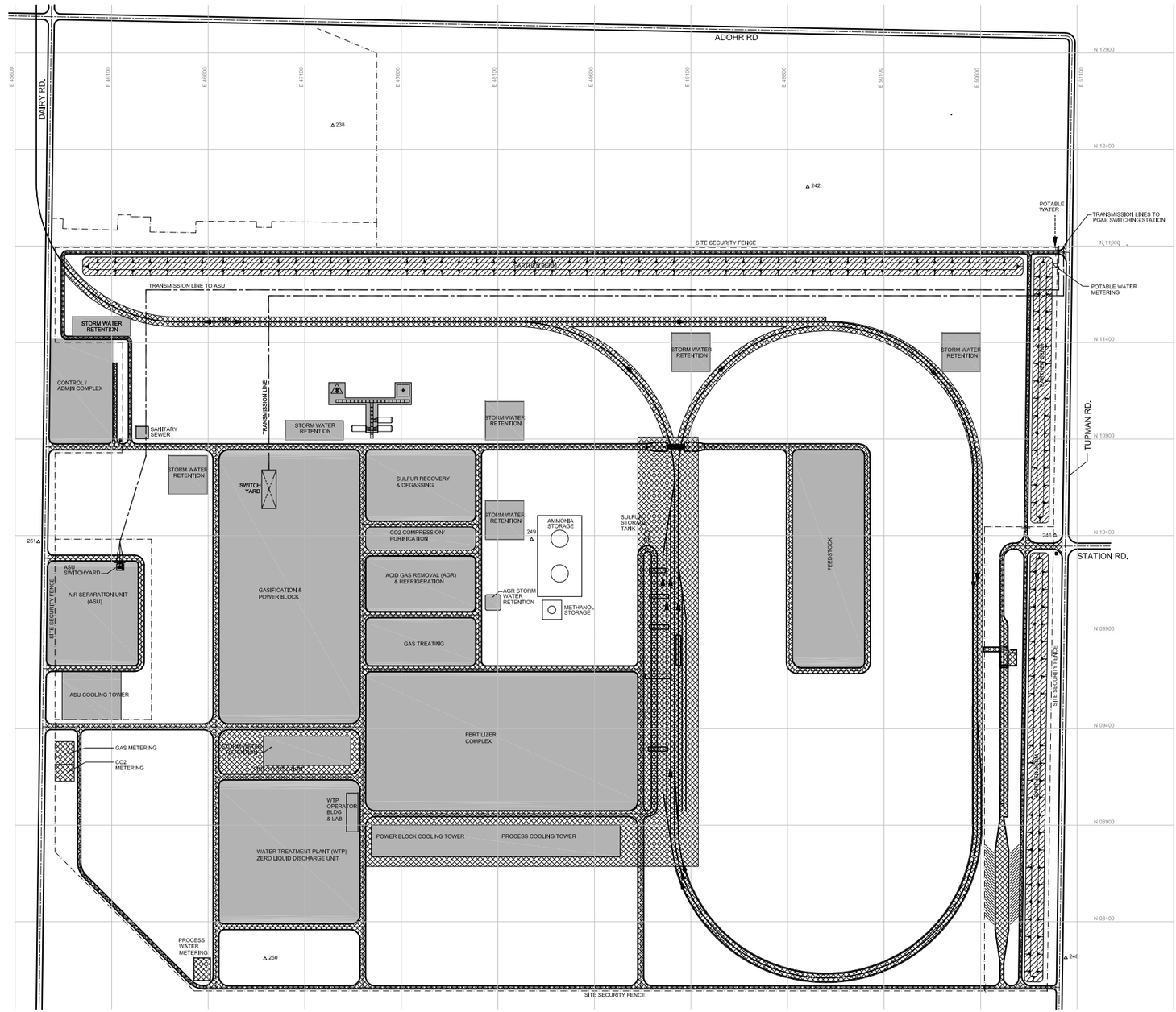

LEGEND:

EL 288.5	H.P. GRADE ELEVATION
TOP / BOTTOM	EARTHEN BERM
	PAD AREA
	UNSUITABLE MATERIAL FROM CLEAR & GRUB
	EXCAVATED FILL MATERIAL
△249	SURVEY MONUMENT POINT NUMBER

EARTHWORK VOLUME	
EXCAVATION *	IMPORT *
850,000 CY	500,000 CY
* SEE NOTES	

NOTE:

1. EARTHWORK QUANTITIES ARE APPROXIMATE AND ARE BASED ON THE PRELIMINARY GEOTECHNICAL INVESTIGATION RECOMMENDATIONS PERTAINING TO THE REMOVAL OF UNSUITABLE SOILS.
2. UNSUITABLE SOIL MATERIAL WILL BE EXCAVATED, AND USED TO CONSTRUCT THE EARTHEN BERMS AND TO LEVEL THE OPEN AREAS AS SHOWN ON THE PLAN.
3. IMPORT MATERIAL WILL BE USED TO FILL THE VOID REMAINING FROM THE REMOVAL OF UNSUITABLE MATERIAL AND TO RAISE GRADE TO THE ELEVATIONS INDICATED.
4. PRELIMINARY EARTHWORK QUANTITIES AND FINAL GRADES WILL VARY DEPENDING ON FINAL GEOTECHNICAL RECOMMENDATIONS AND PLOT PLAN.
5. COORDINATE LOCATIONS SHOWN ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM (CCS 83), ZONE V, 2007.0 EPOCH, RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83). ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
6. PIPING AND FOUNDATIONS NOT SHOWN IN PROCESS AREAS FOR CLARITY.
7. GRADING SYMBOLOGY SHOWN DEPICTS PROPOSED ELEVATIONS FOR DELINEATED AREA.

SURVEY MONUMENT DATA			
CALIFORNIA STATE PLANE COORDINATES			
POINT NO.	NORTHING	EASTING	ELEVATION
238	2,312,523.86	6,147,244.89	286.72
242	2,312,206.46	6,149,704.56	286.79
246	2,310,401.98	6,150,985.50	288.23
248	2,308,213.18	6,151,041.09	287.33
249	2,310,380.25	6,148,274.74	287.69
250	2,308,207.70	6,146,894.35	287.45
251	2,310,368.06	6,145,720.47	286.12

FIGURE 6

0 100' 200' 400' 600' 800' 1000'

SCALE: 1"=200'

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
A	19OCT09	ISSUED FOR CEC AFC	DRM	PMF	BRE
B	14SEP12	ISSUED FOR CEC AMMENDED AFC	DD	RCE	SY

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

		APP DATE
CONTRACT	A4UV	
DESIGNED BY	D. MARTINEZ	
CHECKED BY	P. FORTIER	
SUPERVISOR	B. EISENBISE	19OCT09
LEAD ENGR/SPEC.	P. FORTIER	19OCT09
ENGR MGR	GB	
CLIENT	NA	NA

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HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

CIVIL
PRELIMINARY
GRADING AND DRAINAGE PLAN

SCALE	DRAWING NUMBER	REV
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	CAD FILE NAME A4UV-000-10-SK-0014.dwg	

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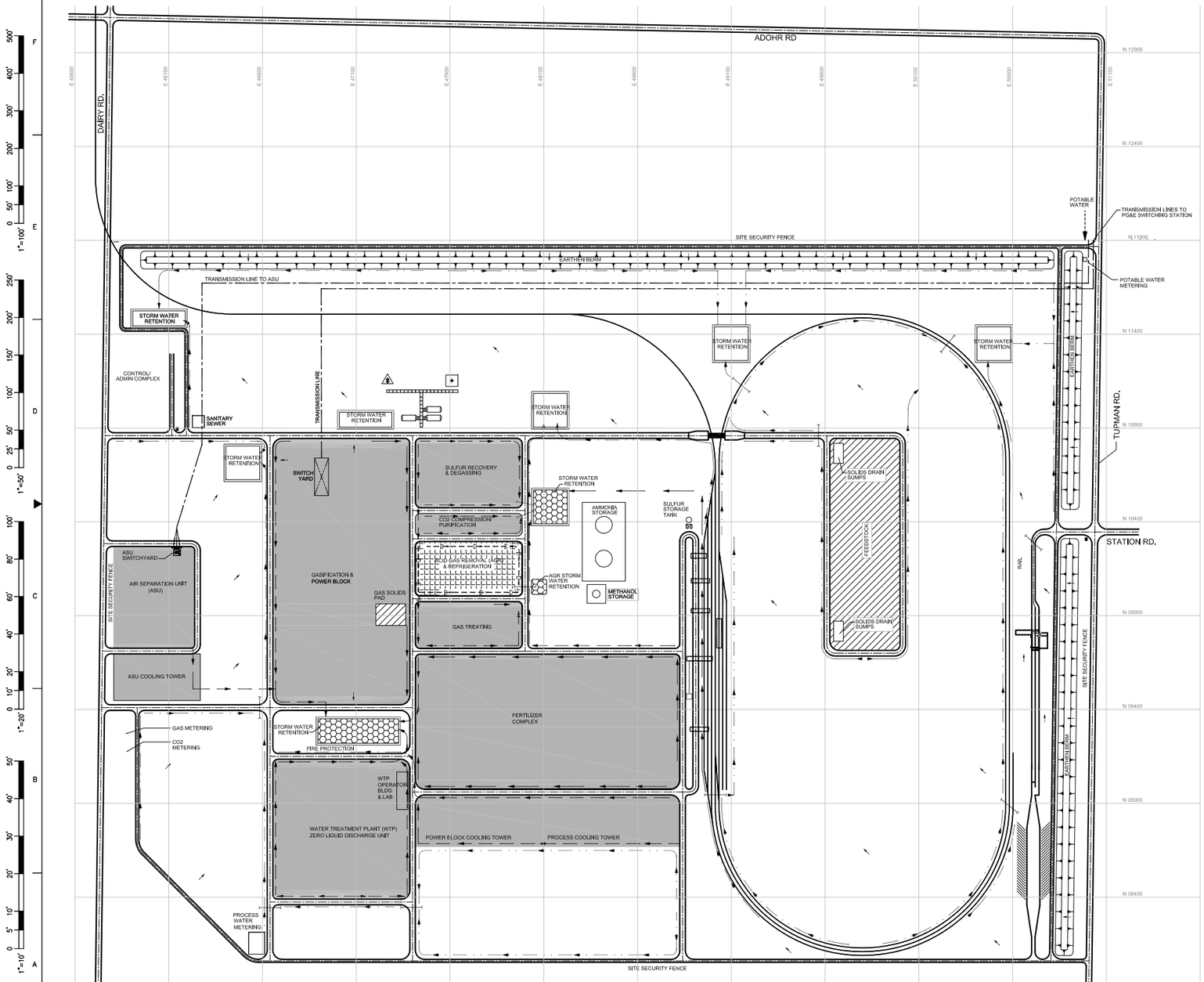

LEGEND

- MAIN PLANT PROCESS AREAS
- SOLIDS HANDLING AREAS
- IMPERMEABLE LINER
- AGR AREA
- STORM WATER DRAINAGE SWALES AND DITCHES FROM NON-PROCESS AREAS
- STORM WATER SYSTEM FROM PROCESS AREAS WHERE SOLIDS ARE NOT PRESENT
- STORM WATER SYSTEM FROM SOLIDS HANDLING AREAS
- STORM WATER SYSTEM FROM AGR PROCESS AREA
- SURFACE RUNOFF
- CULVERT

NOTE:

1. WHERE DISTANCES ARE PROHIBITIVE FOR GRAVITY FLOW, SUMPS AND PUMPS WILL BE USED TO CONVEY RUNOFF TO THE APPROPRIATE DRAINAGE FACILITY FOR WATER TREATMENT OR RETENTION.
2. COLLECTION SUMPS FOR SETTLEMENT OF SOLIDS AND REUSE OF CLARIFIED WATER WILL BE PROVIDED AT SOLIDS HANDLING FACILITIES AT VARIOUS LOCATIONS.
3. UNCONTAMINATED RUN-OFF FROM UNDEVELOPED AREAS WITHIN THE PROJECT SITE AND OUTSIDE THE MAIN PLANT AREA AS WELL AS TEMPORARY USE AREAS WILL DRAIN BY SHEET FLOW TO DITCHES LOCATED ALONG AREA BOUNDARIES AND PLANT ROADS. CULVERTS WILL CONVEY FLOW UNDERNEATH PLANT ROADS AT CROSSING POINTS. RUNOFF COLLECTED IN THIS SYSTEM WILL DISCHARGE TO CLEAN STORM WATER RETENTION BASINS.

   EXISTING DRAINAGE PATTERNS OUTSIDE THE PROJECT SITE WILL REMAIN UNDISTURBED. EXCESS OFFSITE RUNOFF WILL FOLLOW EXISTING DRAINAGE PATTERNS TO CONVEY FLOW AROUND THE SITE. EXISTING DRAINAGE DITCHES LOCATED AT THE SITE PROPERY BOUNDARY WILL BE IMPROVED WHERE NECESSARY.

FIGURE 7

0 100' 200' 400' 600' 800' 1000'

SCALE: 1"=200'

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
A	19OCT09	ISSUED FOR CEC AFC	DRM	PMF	BRE
B	14SEP12	ISSUED FOR CEC AMMENDED AFC	DD	RCE	SY

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

CONTRACT	A4UV
DESIGNED BY	D. MARTINEZ
CHECKED BY	P. FORTIER
SUPERVISOR	B. EISENBISE 19OCT09
LEAD ENGR/SPEC.	P. FORTIER 19OCT09
ENGR MGR	
CLIENT	NA

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HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

CIVIL
PRELIMINARY
SITE DRAINAGE PATTERNS

SCALE	DRAWING NUMBER	REV
1"=200'	A4UV-000-10-SK-0015	B
	CAD FILE NAME A4UV-000-10-SK-0015.dwg	

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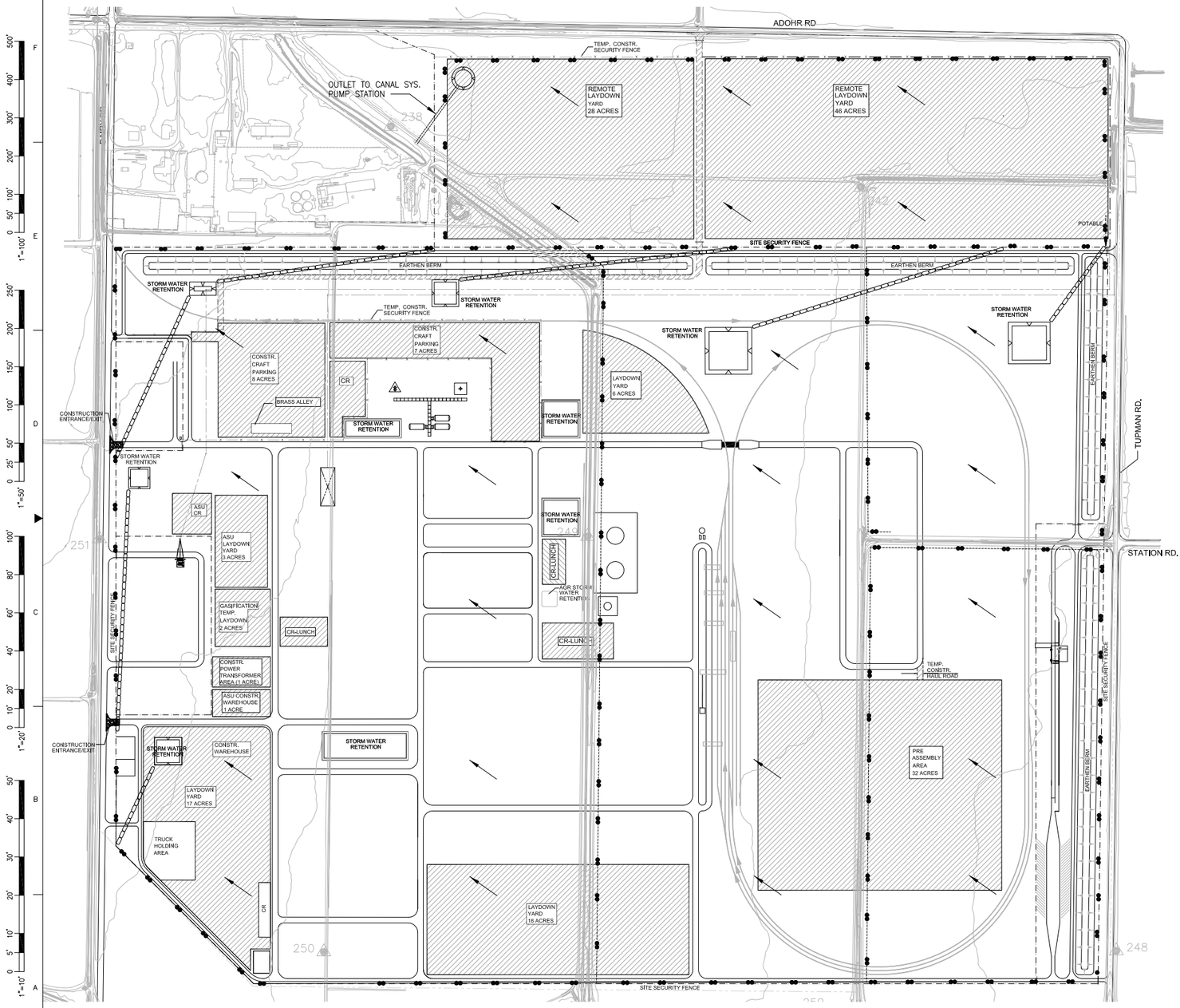
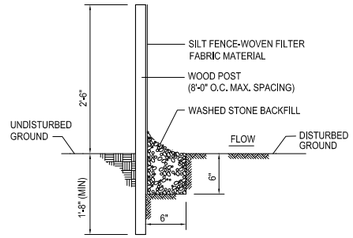


PLANT (STATE PLANE) NAD83

LEGEND

- TEMPORARY FACILITIES AREA
- SECURITY FENCE
- TEMPORARY FENCE
- SAND BAGS (BMP SE-8) (TWO ROWS OF SAND BAGS)
- SILT FENCE (BMP SE-1)
- STABILIZED CONSTRUCTION ENTRANCE/EXIT (BMP TR-1) ENTRANCE/OUTLET TIRE WASH (BMP TR-3)
- FLOW DIRECTION
- RETENTION BASIN
- TEMPORARY DETENTION BASIN (FOR CONSTRUCTION LAYDOWN AREA ONLY)

TYPICAL SANDBAG BARRIER DETAIL (BMP SE-8)
NTS



TYPICAL SILT FENCE DETAIL (BMP SE-1)

FIGURE 8

0 100' 200' 400' 600' 800' 1000'
SCALE: 1"=200'

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
A	19OCT09	ISSUED FOR CEC AFC	DRM	PMF	BRE
B	14SEP12	ISSUED FOR CEC AMMENDED AFC	DD	RCE	SY

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

CONTRACT	A4UV	
DESIGNED BY	D. MARTINEZ	
CHECKED BY	P. FORTIER	
SUPERVISOR	B. EISENBISE	APP DATE 19OCT09
LEAD ENGR/SPEC.	P. FORTIER	APP DATE 19OCT09
ENGR MGR		APP DATE
CLIENT	NA	APP DATE

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HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

CIVIL CONCEPTUAL EROSION CONTROL PLAN

SCALE	DRAWING NUMBER	REV
1"=200'	A4UV-000-10-SK-0016	B
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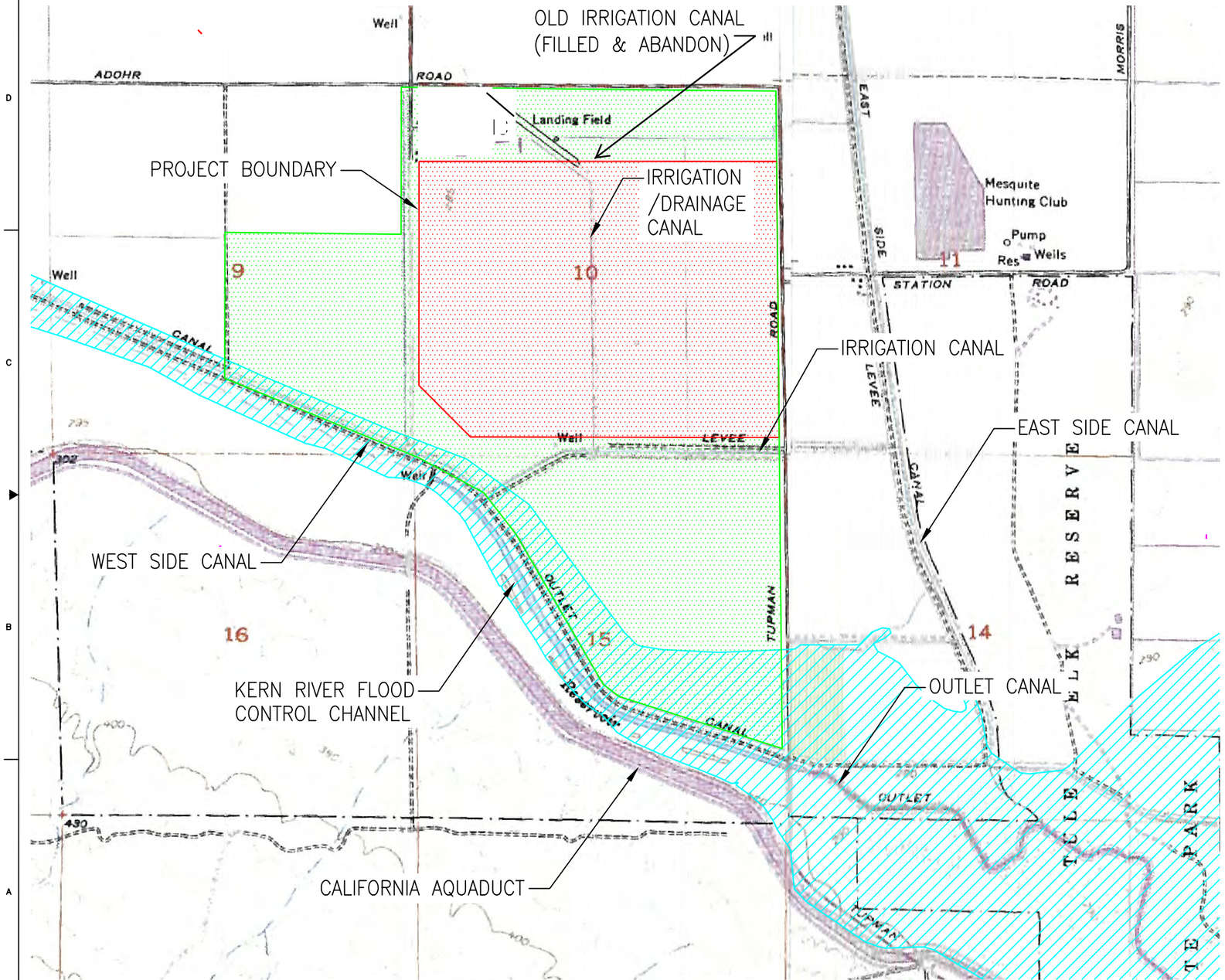


(PLANT GRID)

N

LEGEND

- 100 – YEAR INUNDATION LIMIT
- HECA PROJECT SITE
- HECA CONTROLLED AREA

REFERENCE:

FIRM (FLOOD INSURANCE REFERENCE MAP)
KERN COUNTY, CALIFORNIA AND INCORPORATED AREA

PANEL:
0600752250
0600752225

FIGURE 9

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV	REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV	REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A	26OCT10	ISSUED FOR REVIEW AND COMMENT	BMF	PMF	BRE							SK-250-1001	PRELIMINARY PLOT PLAN
B	14SEP12	ISSUED FOR CEC AMMENDED AFC	DD	REC	SY								

FLUOR

CONTRACT	A4UV	
DESIGNED BY	D. OLIVER	
CHECKED BY	P. FORTIER	
SUPERVISOR	B. EISENBISE	APP DATE
LEAD ENGR/SPEC.		APP DATE
ENGR MGR	GB	APP DATE
CLIENT	NA	APP DATE NA

hydrogen energy

HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

100 YEAR INUNDATION MAP

SCALE	DRAWING NUMBER	REV
1"=800'	A4UV-000-10-SK-0017	B
	CAD FILE NAME A4UV-000-10-SK-0017.dwg	

PLOT DATE: 09-18-12 8:01 am Printed By: duo30902 Q:\CAD\210\DWG\Report\A4UV-000-10-SK-0017.dwg

1"=100' 1"=50' 1"=20' 1"=10' 1/2"=1'-0" 3/8"=1'-0" 1/4"=1'-0" 1/8"=1'-0"

APPENDIX A
SOIL MAPPING UNITS

Table A-1
Soil Mapping Units—Descriptions and Properties

Soil Series	Surface Texture	Depth to Bedrock or Restrictive Feature[1]	Drainage	Runoff	Hydrologic Soil Group[2]	Land Capability Class (Non-Irrigated)[3]	Erosion Factor T[4]	Erosion Factor K[5]	Surface pH	Risk of Corrosive Action on Steel[6]	Farmland Category
Kern County Northwestern Part											
Buttonwillow clay, drained, 0 to 2% slopes (123)	Clay	No restrictive feature within 200 cm	Somewhat poorly drained	High	C	7s	5	0.24	7.9–8.4	High	Prime Farmland if irrigated
Cajon loamy sand, 0 to 2% slopes (125)	Loamy sand	No restrictive feature within 200 cm	Somewhat excessively drained	Negligible	A	7s	5	0.15	7.4–8.4	Moderate	Prime Farmland if irrigated
Cajon loamy sand, 2 to 5% slopes (126)	Loamy sand	No restrictive feature within 200 cm	Somewhat excessively drained	Negligible	A	7e	5	0.15	7.4–8.4	Moderate	Prime Farmland if irrigated
Elkhills sandy loam, 9 to 50% slopes, eroded (146)	Gravely sandy loam	No restrictive feature within 200 cm	Well drained	Medium	B	7e	5	0.20	7.4–8.4	High	Not Prime Farmland
Garces silt loam, 0 to 2% slopes (156)	Silt loam	No restrictive feature within 200 cm	Well Drained	Very High		7s	4	0.49	7.9-9.0	High	Farmland of state-wide importance
Garces silt loam, hard substratum, 0 to 2% slopes (158)	Silt loam	N/A	Well drained	Very slow	B	N/A	N/A	N/A	N/A	N/A	N/A
Kimberlina fine sandy loam, 0 to 2% slopes (174)	Fine sandy loam	No restrictive feature within 200 cm	Well drained	Very low	B	7c	5	0.24	6.6–8.4	High	Prime Farmland if irrigated
Kimberlina fine sandy loam, saline-alkali, 0 to 2% slopes (179)	Fine sandy loam	No restrictive feature within 200 cm	Well drained	Medium	B	7s	5	0.24	7.9–8.4	High	Farmland of State-Wide Importance

Table A-1
Soil Mapping Units—Descriptions and Properties (Continued)

Soil Series	Surface Texture	Depth to Bedrock or Restrictive Feature[1]	Drainage	Runoff	Hydrologic Soil Group[2]	Land Capability Class (Non-Irrigated)[3]	Erosion Factor T[4]	Erosion Factor K[5]	Surface pH	Risk of Corrosive Action on Steel[6]	Farmland Category
Lokern clay, drained, 0 to 2% slopes (187)	Clay	No restrictive feature within 200 cm	Moderately well drained	High	C	7s	5	0.28	7.9–8.4	High	Prime Farmland if irrigated
Lokern clay, saline-alkali, drained, 0 to 2% slopes (188)	Clay	No restrictive feature within 200 cm	Moderately well drained	Very High	D	7s	5	0.28	7.9–8.4	High	Not Prime Farmland
Milham sandy loam, 0 to 2% slopes (196)	Sandy loam	No restrictive feature within 200 cm	Well drained	Medium	B	7c	5	0.32	7.4–8.4	High	Prime Farmland if irrigated
Panoche clay loam, 0 to 2% slopes (211)	Clay loam	No restrictive feature within 200 cm	Well drained	Low	B	7c	5	0.43	7.4–8.4	High	Prime Farmland if irrigated
Panoche clay loam, saline-alkali, 0 to 2% slopes (214)	Clay loam	No restrictive feature within 200 cm	Well drained	Medium	B	7s	5	0.43	7.4–8.4	High	Farmland of State-Wide Importance
Torriorthents stratified, eroded-Elkhills complex, 9 to 50% slopes (232)	Sandy loam, gravelly sandy loam	No restrictive feature within 200 cm	Well drained	Medium to high	C	7e	5	0.20	7.4–8.4	High	Not Prime Farmland
Westhaven fine sandy loam, 0 to 2% slopes (245)	Sandy loam	No restrictive feature within 200 cm	Moderately well drained	Medium	B	7c	5	0.37	7.4-8.4	High	Prime farmland if irrigated
Kern County, Southwestern Part											
Granoso loamy sand, 2 to 5% slopes (121)	Loamy sand	No restrictive feature within 200 cm	Somewhat excessively drained	Very low	A	7e	5	0.17	7.4–8.4	Low	Farmland of State-Wide Importance

Table A-1
Soil Mapping Units—Descriptions and Properties (Continued)

Soil Series	Surface Texture	Depth to Bedrock or Restrictive Feature[1]	Drainage	Runoff	Hydrologic Soil Group[2]	Land Capability Class (Non-Irrigated)[3]	Erosion Factor T[4]	Erosion Factor K[5]	Surface pH	Risk of Corrosive Action on Steel[6]	Farmland Category
Kimberlina fine sandy loam, saline-sodic, 0 to 2% slopes (212)	Fine sandy loam	No restrictive feature within 200 cm	Well drained	Low	B	7s	3	0.24	7.9–8.4	High	Farmland of State-Wide Importance

Source: USDA SCS, 1988; NRCS, 2009.

Notes:

[1] *Depth to Bedrock or Restrictive Feature:* Represents a restrictive layer that is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

[2] *Hydrologic Soil Groups:* Are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms. The four hydrologic soil groups are:
Group A – Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well-drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
Group B – Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
Group C – Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
Group D – Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

[3] *Land Capability Classes: Class 7* soils have very severe limitations that make them unsuited to cultivation and that restrict their use mainly to grazing, forest land, or wildlife. *Subclass s* indicates that the soil is limited mainly because it is shallow, droughty, or stony; *Subclass c* indicates that the soil is limited by climates that are very cold or very dry; and *Subclass e* indicates susceptibility to erosion is the dominant problem or hazard affecting use with erosion susceptibility and past erosion damage comprising the major soil factors that affect soils in this subclass; Subclass s indicates that the soil is limited mainly because it is shallow, droughty, or stony.

[4] *T Factor:* is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

[5] *Erosion Factor K:* indicates the susceptibility of a soil to sheet and rill erosion by water. *Factor K* is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of *K* range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

[6] *Risk of Corrosion:* pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer. For uncoated steel, the risk of corrosion—expressed as "low," "moderate," or "high" —is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

cm = centimeter
% = percent
N/A = not available

Source: URS Amended AFC, May 2012, Table 5.9-2 – Soil Mapping Units – Description and Properties

APPENDIX B
PRELIMINARY HYDROLOGY STUDY

HYDROGEN ENERGY CALIFORNIA (HECA)

KERN COUNTY POWER PROJECT

PRELIMINARY HYDROLOGY STUDY

Rev. No.	Date	By	Checked	Approved
0	05/19/09	P. Fortier	B. Eisenbise	W. Becktel
1	11/05/10	P.Fortier	B. Eisenbise	W. Becktel
2	9/27/12	S. Levisee	S. Yench	W. Becktel

TABLE OF CONTENTS

Analysis Parameters

Existing Site Parameters

Area:	453 Ac
Stream Length:	4,004 ft
High Point Elevation	288 ft
Low Point Elevation	285 ft
Delta Elevation:	3 ft
Slope:	0.0007 ft/ft

Soil Characteristic

Soil Type:	Clay and Silty-Clay
Soil Group:	D

Reference: *Prelimnary Geotechnical Investigations*
Kern County Hydrology Manual - Section C.3 - Hydrologic Soil Group

Rainfall Event

Storm Duration:	24 h
Storm Distribution:	Type 1

Rainfall Depth:

Storm Frequencies	***Rainfall*** (in)
2-yr	1.0
5-yr	1.5
10-yr	1.8
25-yr	2.3
50-yr	2.7
100-Yr	3.1

Reference: *NOAA Atlas 14 - Volume 6, Version 2 California*
Per County Engineering Bulletin 11-02

Ground Cover

Existing:

Drainage Area	***Surface***	***Condition***	***Area***	***Impervious*** [1]	***CN***	***CNw*** [2]
DE	Agricultural Close Seeded	Good	453 ac	3%	85	85

Proposed:

Drainage Area	***Surface***	***Condition***	***Area***	***Impervious*** [1]	***CN***	***CNw*** [2]
DA 1	Graded, some gravel	--	58.0 ac	9%	78	80
DA 2	Graded, some gravel	--	68.5 ac	11%	78	80
DA 3	Process Area-Paved	--	13.3 ac	95%	98	98
DA 4	Graded, some gravel	--	24.0 ac	5%	91	91
DA 5	Graded, some gravel	--	91.9 ac	7%	78	79
DA 6	Graded, some gravel	--	103.7 ac	10%	78	80
DA 7	Process Area-Paved	--	15.7 ac	88%	98	98
DA 8	Process Area-Paved	--	4.8 ac	96%	98	98
DA 9	Process Area-Paved	--	73.1 ac	94%	98	98
Total			**453.0 ac**	29%		

Reference: *Kern County Hydrology Manual - Figure C-2*

Notes: *1) Impervious surfaces have a CN value of 98*
2) CNw is the weighted CN value of the impervious and pervious surfaces

Analyses Summary Table

Total tributary area:	453	ac
Percentage impervious area before construction:	3	%
Percentage impervious area after construction:	29	%
Developed total volume of onsite stormwater storage:	74.7	ac-ft
Construction Phase total volume of onsite stormwater storage:	36.2	ac-ft

Stormwater Volumes for Each Condition of the Project Site and Storm Event

	10 Year		*50 Year*		*100 Year*	
	Hydrograph Volume	*Retention Basin Storage (Max)*	*Hydrograph Volume*	*Retention Basin Storage (Max)*	*Hydrograph Volume*	*Retention Basin Storage (Max)*
	(ac-ft)	*(ac-ft)*	*(ac-ft)*	*(ac-ft)*	*(ac-ft)*	*(ac-ft)*
Existing Conditions	21.0	-	44.2	-	55.5	-
Developed Conditions	30.9	25.8	51.5	46.4	59.8	54.7
Construction Phase Conditions	N/A	N/A	N/A	N/A	11.6	6.8

Analysis Summary Table

Duration: 24-Hour

Existing Conditions:

	10-Year		50-Year		100-Year	
	Peak Flow	***Hydrograph Vol.***	***Peak Flow***	***Hydrograph Vol.***	***Peak Flow***	***Hydrograph Vol.***
Drainage Area	(cfs)	(ac-ft)	(cfs)	(ac-ft)	(cfs)	(ac-ft)
DE	28.4	21.0	62.9	44.2	79.7	55.5

Note: *1) Existing conditions - Excess rainfall within the controled area is intercepted and retained onsite in the irrigation ditches.*

Retention Basin Sizing Calculation per Kern County Standards

	Rainfall	***% Impervious***	***Area***	***V_e***	***Basin Average Surface Area***	***Max Basin Depth***	***V_a***	***Retention Basin***	**Infiltration**	**Outflow**
Drainage Area	D_{10}	a_i	(ac)	(ac-ft)	(ac)	(ft)	(ac-ft)	ID	(in/hr)	(cfs)
DA 1	1.8	9%	58.0	1.1	0.32	15	4.8	Basin #1	1.0	-
DA 2	1.8	11%	68.5	1.6	0.55	15	8.3	Basin #2	1.0	-
DA 3	1.8	95%	13.3	2.7	0.43	10	4.3	Basin #3/Lined	-	0.17
DA 4	1.8	5%	24.0	0.3	0.55	15	8.3	Basin #4	1.0	-
DA 5	1.8	7%	91.9	1.5	0.55	15	8.3	Basin #5	1.0	-
DA 6	1.8	10%	103.7	2.3	0.55	15	8.3	Basin #6	1.0	-
DA 7	1.8	88%	15.7	3.0	0.66	10	6.6	Basin #7/Lined	-	0.17
DA 8	1.8	96%	4.8	1.0	0.26	5	1.3	Basin #8/Lined	-	0.17
DA 9	1.8	94%	73.1	14.9	3.07	8	24.6	Basin #9/Lined	-	0.17
Total			**453.0**	**28.4**			**74.7**			

Note: *1) Kern County Hydrology Manual - Section VIII - Retention Basin Design*
Section 408.1 -Design Volume:
Runoff Volume from the ISDD five day storm event (V_e) = 0.12 (D_{10}) (a_i) (Area)
D_{10} = 10 year 24 hour depth of rainfall
a_i = average percentages of impervious
Area = Drainage Area
2) Refer to Civil Hydrology Map.
3) Runoff draining to sumps will be retained within process units and solid handling areas for reuse.
4) Retention basins depths are given above
5) Retention basin side slope of 3H:1V.
6) Retention basins include at least 1 foot of freeboard for the Intermediate Storm Design Discharge (ISDD).
7) Kern County Hydrlogy Manual - Section 408-08.01 - Retention basin drawdown time for ISDD is seven (7) days.
8) Low permeability soil under the retention basin bottom will be replaced with well graded permeable soil to allow percolation of the stormwater into the sandy layer found 6 to 12 feet below the existing ground. A conservative infiltration rate for sand of 1.0 in/hr was used to model the drawdown time of the retention basin.
9) Outflow from lined retention basins and sumps are based on the available capacity at the treatment plant or clarifier.
10) V_a = actual storage capacity of the retention basins or sumps, which includes the ISDD 1 foot of freeboard.

Developed Conditions:
Refer to Civil Preliminary Hydrology Map i

Storm Event: 10 Year

	Drainage Area		Retention Basin					
	Peak Flow	***Hydrograph Vol.***	***ID***	***Storage (Max)***	***HGL***	***Freeboard***	***Drawdown***	V_a
Drainage Area	(cfs)	(ac-ft)		(ac-ft)	(ft)	(ft)	(hr) (day)	(ac-ft)
DA 1	3.9	2.0	Basin #1	1.4	3.6	6.4	43 1.8	*4.8*
DA 2	3.8	2.4	Basin #2	1.3	2.4	7.6	29 1.2	*8.3*
DA 3	11.2	1.7	Basin #3/Lined	1.7	7.6	2.4	123 5.1	*4.3*
DA 4	9.0	2.0	Basin #4	0.9	1.7	8.3	20 0.9	*8.3*
DA 5	5.6	3.2	Basin #5	2.1	3.7	6.3	44 1.9	*8.3*
DA 6	6.4	6.3	Basin #6	5.2	4.3	5.7	52 2.2	*8.3*
DA 7	11.9	3.2	Basin #7/Lined	3.2	3.0	7.0	232 9.7	*6.6*
DA 8	4.2	0.6	Basin #8/Lined	0.6	2.2	7.8	43 1.8	*1.3*
DA 9	42.3	9.5	Basin #9/Lined	9.5	3.0	7.0	688 28.7	*24.6*
Total		**30.9**		**25.8**				***74.7***

Note: *1) Drawdown time equals the interval between the beginning of the rainfall to the time the retention basin or sump is empty.*

Storm Event: 50 Year

	Drainage Area		Retention Basin / Sump					
	Peak Flow	***Hydrograph Vol.***	***ID***	***Storage (Max)***	***HGL***	***Freeboard***	***Drawdown***	V_a
Drainage Area	(cfs)	(ac-ft)		(ac-ft)	(ft)	(ft)	(hr) (day)	(ac-ft)
DA 1	11.2	4.8	Basin #1	4.2	9.9	0.1	119 5.0	*4.8*
DA 2	10.7	5.5	Basin #2	4.4	7.2	2.8	86 3.6	*8.3*
DA 3	17.2	2.7	Basin #3/Lined	2.7	10.0	0.0	196 8.2	*4.3*
DA 4	16.8	3.6	Basin #4	2.5	4.0	6.0	48 2.0	*8.3*
DA 5	16.1	7.4	Basin #5 **	6.3	10.0	0.0	120 5.0	*8.3*
DA 6	18.4	8.4	Basin #6 **	7.3	10.0	0.0	120 5.0	*8.3*
DA 7	18.3	3.2	Basin #7/Lined	3.2	4.7	5.3	232 9.7	*6.6*
DA 8	6.5	1.0	Basin #8/Lined	1.0	3.5	6.5	72 3.0	*1.3*
DA 9	65.2	14.9	Basin #9/Lined	14.9	4.8	5.2	1080 45.0	*24.6*
Total		**51.5**		**46.4**				***74.7***

Note: *1) Drawdown time equals the interval between the beginning of the rainfall to the time the retention basin or sump is empty.*
*** Overflow to site*

Storm Event: 100 Year

	Drainage Area		Retention Basin / Sump					
	Peak Flow	***Hydrograph Vol.***	***ID***	***Storage (Max)***	***HGL***	***Freeboard***	***Drawdown***	V_a
Drainage Area	(cfs)	(ac-ft)		(ac-ft)	(ft)	(ft)	(hr) (day)	(ac-ft)
DA 1	15.2	6.2	Basin #1 **	5.6	10.0	0.0	120 5.0	*4.8*
DA 2	14.4	3.3	Basin #2	2.2	9.6	0.4	115 4.8	*8.3*
DA 3	19.9	3.2	Basin #3/Lined	3.2	10.0	0.0	232 9.7	*4.3*
DA 4	20.4	4.3	Basin #4	3.2	5.0	5.0	60 2.5	*8.3*
DA 5	21.9	9.6	Basin #5 **	8.5	10.0	0.0	120 5.0	*8.3*
DA 6	25.0	10.9	Basin #6 **	9.8	10.0	0.0	120 5.0	*8.3*
DA 7	21.1	3.8	Basin #7/Lined	3.8	5.5	4.5	275 11.5	*6.6*
DA 8	7.5	1.1	Basin #8/Lined	1.1	4.1	5.9	80 3.3	*1.3*
DA 9	75.6	17.4	Basin #9/Lined	17.4	5.6	4.4	1261 52.5	*24.6*
Total		**59.8**		**54.7**				***74.7***

Note: *1) Drawdown time equals the interval between the beginning of the rainfall to the time the retention basin or sump is empty.*
*** Overflow to site*

Construction Phase Conditions

Refer to Construction Hydrology Map i

Storm Event: 100 Year

Drainage Area	Peak Flow (cfs)	Hydrograph Vol. (ac-ft)	ID	Storage (Max) (ac-ft)	HGL (ft)	Freeboard (ft)	Drawdown (hr)	Drawdown (day)	V_a (ac-ft)
	Drainage Area		**Temporary Retention Basins (10' Deep)**						
DA 1	4.2	1.3	Ret #1	0.7	2.9	7.1	35	1.5	*4.8*
DA 2	7.1	1.7	Ret #2	0.6	2.6	7.4	31	1.3	*8.3*
DA 3	8.6	3.5	Ret #3	2.6	5.3	4.7	64	2.7	*6.6*
DA 4	6.5	2.0	Ret #4	0.9	3.1	6.9	37	1.6	*8.3*
DA 5	9.2	3.1	Ret #5	2.0	4.7	5.3	56	2.4	*8.3*
Total		**11.6**		**6.8**					***36.2***

Note: *1) Drawdown time equals the interval between the beginning of the rainfall to the time the retention basin or sump is empty.*

2) Low permeability soil under the retention basin bottom will be replaced with well graded permeable soil to allow percolation of the stormwater into the sandy layer found 6 to 12 feet below the existing ground. A conservative infiltration rate for sand of 1.0 in/hr was used to model the drawdown time of the retention basin.

Excess Ponding for Over Capacity Basins (Developed Condition)

Refer to Ponding Exhibit

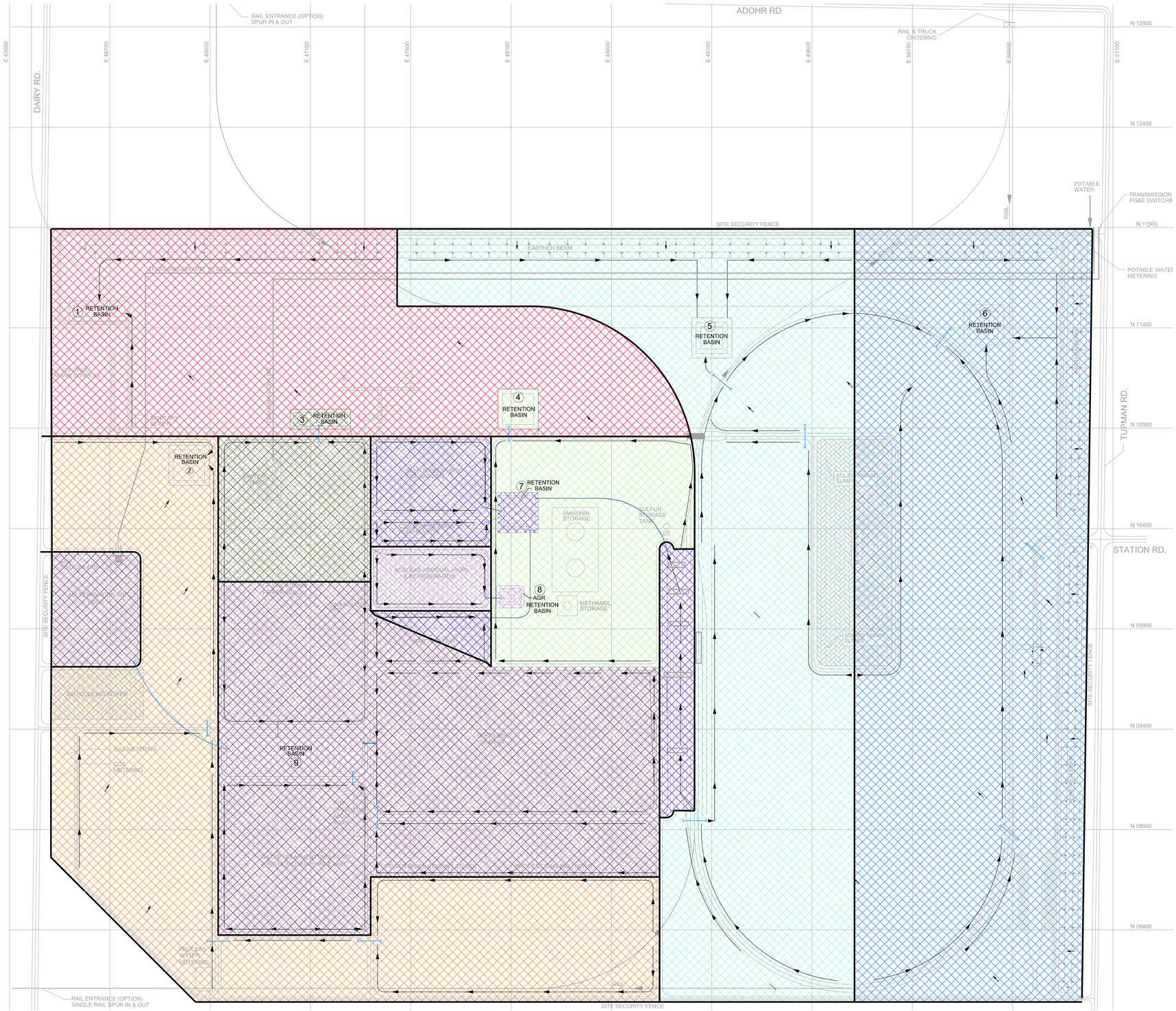
Drainage Area	Max. Available Basin Capacity (ac-ft)	100 Yr Runoff Volume (ac-ft)	Excess Storage Required (Onsite) (ac-ft)	Available Area (ac)	Max. Average Depth (ft)
DA 1	4.8	6.2	1.4	3.1	0.4
DA 5	8.3	9.8	1.5	5.4	0.3
DA 6	8.3	11.0	2.7	6.7	0.4

* Ponding Within Process Unit

Key Design Assumptions and Methodologies

The application CivilStorm V8i by Bentley has been used for calculations.
Preliminary Geotechnical Investigation, Proposed Hydrogen Energy California Project, Dated March 2009
Kern County Hydrology Manual
NOAA Atlas 14 - Precipitation Frequency Atlas Western United States - Volume 6 California

APPENDIX A – HYDROLOGY MAPS



LEGEND

- IMPERMEABLE LINER
- CONCRETE PAVING
- DRAINAGE AREA BOUNDARY
- STORM WATER DRAINAGE SWALES AND DITCHES
- CULVERT
- DRAINAGE AREA 1 – (58.0 AC)
- DRAINAGE AREA 2 – (68.5 AC)
- DRAINAGE AREA 3 – (13.3 AC) – LINED BASIN
- DRAINAGE AREA 4 – (24.0 AC)
- DRAINAGE AREA 5 – (91.9 AC)
- DRAINAGE AREA 6 – (103.7 AC)
- DRAINAGE AREA 7 – (15.7 AC) – LINED BASIN
- DRAINAGE AREA 8 – (4.8 AC) – LINED BASIN
- DRAINAGE AREA 9 – (73.1 AC) – LINED BASIN

TOTAL AREA = 453.0 AC

NOTE:

1. WHERE DISTANCES ARE PROHIBITIVE FOR GRAVITY FLOW, SUMPS AND PUMPS WILL BE USED TO CONVEY RUNOFF TO THE APPROPRIATE DRAINAGE FACILITY FOR WATER TREATMENT OR RETENTION.

2. COLLECTION SUMPS FOR SETTLEMENT OF SOLIDS AND REUSE OF CLARIFIED WATER WILL BE PROVIDED AT SOLIDS HANDLING FACILITIES AT VARIOUS LOCATIONS.

3. UNCONTAMINATED RUN–OFF FROM UNDEVELOPED AREAS WITHIN THE PROJECT SITE AND OUTSIDE THE MAIN PLANT AREA AS WELL AS TEMPORARY USE AREAS WILL DRAIN BY SHEET FLOW TO DITCHES LOCATED ALONG AREA BOUNDARIES AND PLANT ROADS. CULVERTS WILL CONVEY FLOW UNDERNEATH PLANT ROADS AT CROSSING POINTS. RUNOFF COLLECTED IN THIS SYSTEM WILL DISCHARGE TO CLEAN STORM WATER RETENTION BASINS. EXISTING DRAINAGE PATTERNS OUTSIDE THE PROJECT SITE WILL REMAIN UNDISTURBED. EXCESS OFFSITE RUNOFF WILL FOLLOW EXISTING DRAINAGE PATTERNS TO CONVEY FLOW AROUND THE SITE. EXISTING DRAINAGE DITCHES LOCATED AT THE SITE PROPERTY BOUNDARY WILL BE IMPROVED WHERE NECESSARY.

0 100' 200' 400' 600' 800' 1000'

SCALE: 1"=200'

FIGURE "B-1"

PAGE 9 OF 32

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
2	9-27-12	ISSUED FOR PERMIT	SDL	SY	GB

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

FLUOR®

CONTRACT	A4UV
DESIGNED BY	S. LEVISEE
CHECKED BY	S. YENCH
SUPERVISOR	CY
LEAD ENGR/SPEC.	JL
ENGR MGR	GB
CLIENT	NA

hydrogen energy

HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

PRELIMINARY STORM WATER DRAINAGE PLAN

SCALE	DRAWING NUMBER	REV
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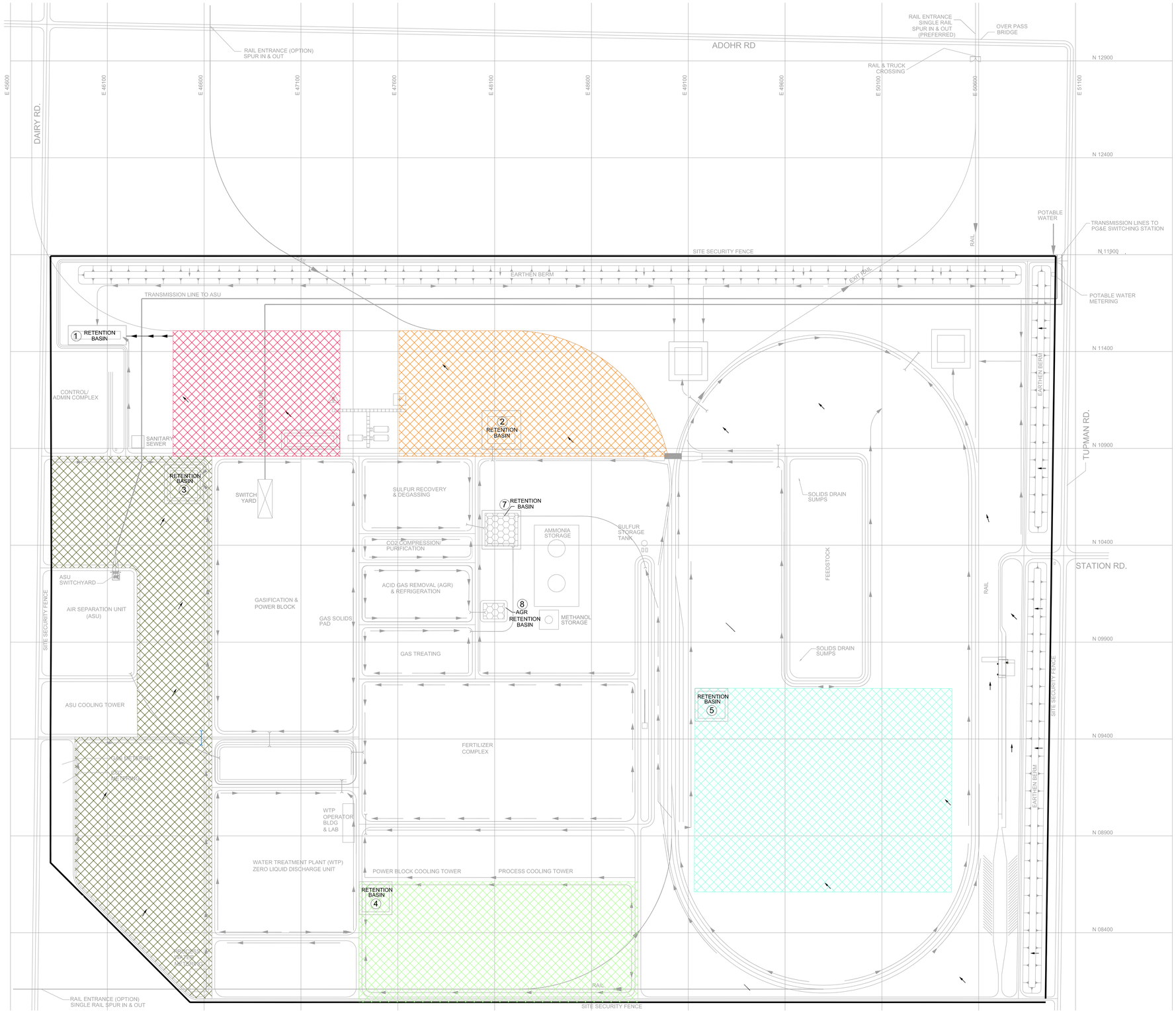
	CAD FILE NAME A4UV-000-10-SK-0002.dwg	



LEGEND

- STORM WATER DRAINAGE SWALES AND DITCHES
- CULVERT
- DRAINAGE AREA BOUNDARY
- CONSTRUCTION DRAINAGE AREA 1 – (12.8 AC)
- CONSTRUCTION DRAINAGE AREA 2 – (17.6 AC)
- CONSTRUCTION DRAINAGE AREA 3 – (36.5 AC)
- CONSTRUCTION DRAINAGE AREA 4 – (20.6 AC)
- CONSTRUCTION DRAINAGE AREA 5 – (32.0 AC)

TOTAL AREA = 119.5 AC

NOTE:

1. WHERE DISTANCES ARE PROHIBITIVE FOR GRAVITY FLOW, SUMPS AND PUMPS WILL BE USED TO CONVEY RUNOFF TO THE APPROPRIATE DRAINAGE FACILITY FOR WATER TREATMENT OR RETENTION.
2. COLLECTION SUMPS FOR SETTLEMENT OF SOLIDS AND REUSE OF CLARIFIED WATER WILL BE PROVIDED AT SOLIDS HANDLING FACILITIES AT VARIOUS LOCATIONS.
3. UNCONTAMINATED RUN–OFF FROM UNDEVELOPED AREAS WITHIN THE PROJECT SITE AND OUTSIDE THE MAIN PLANT AREA AS WELL AS TEMPORARY USE AREAS WILL DRAIN BY SHEET FLOW TO DITCHES LOCATED ALONG AREA BOUNDARIES AND PLANT ROADS. CULVERTS WILL CONVEY FLOW UNDERNEATH PLANT ROADS AT CROSSING POINTS. RUNOFF COLLECTED IN THIS SYSTEM WILL DISCHARGE TO CLEAN STORM WATER RETENTION BASINS.

   EXISTING DRAINAGE PATTERNS OUTSIDE THE PROJECT SITE WILL REMAIN UNDISTURBED. EXCESS OFFSITE RUNOFF WILL FOLLOW EXISTING DRAINAGE PATTERNS TO CONVEY FLOW AROUND THE SITE. EXISTING DRAINAGE DITCHES LOCATED AT THE SITE PROPERY BOUNDARY WILL BE IMPROVED WHERE NECESSARY.

0 100' 200' 400' 600' 800' 1000'

SCALE: 1"=200'

FIGURE "B-2"

PAGE 10 OF 32

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
2	9-27-12	ISSUED FOR PERMIT	SDL	SY	GB

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

Proprietary Fluor Information Submitted in Confidence
Releasable to DOE Only as Specified in Subcontract No. 674
Not Subject to Release Under FOIA

FLUOR®

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CONTRACT	A4UV	
DESIGNED BY	S. LEVISEE	
CHECKED BY	S. YENCH	
SUPERVISOR	CY	APP DATE
LEAD ENGR/SPEC.	JL	APP DATE
ENGR MGR	GB	APP DATE
CLIENT	NA	APP DATE

hydrogen energy

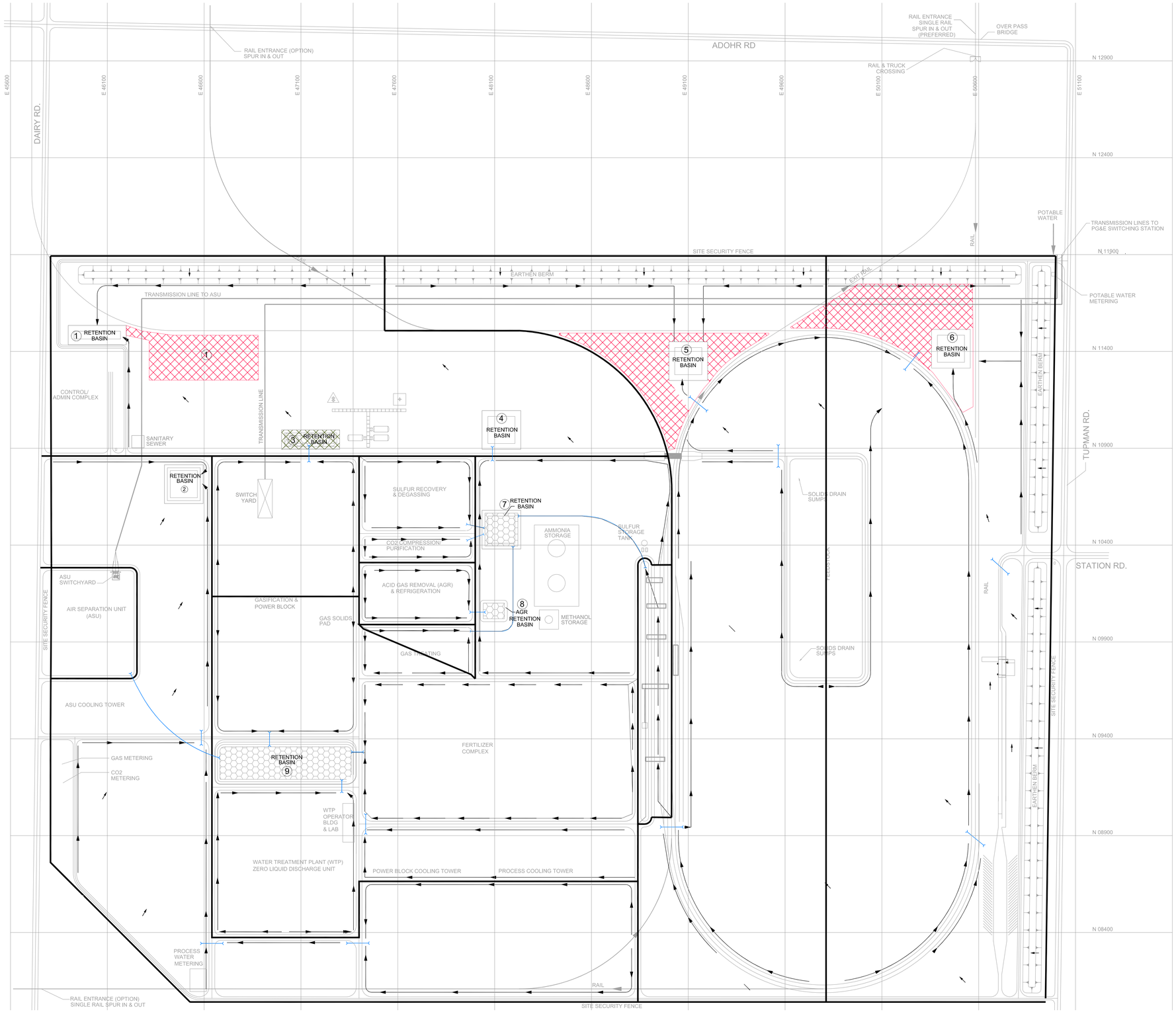
HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

PRELIMINARY STORM WATER CONSTRUCTION HYDROLOGY MAP

SCALE	DRAWING NUMBER	REV
1"=200'	A4UV-000-10-SK-0003	E
	CAD FILE NAME A4UV-000-10-SK-0003.dwg	

PLOT DATE: 10-04-12 10:46 am Printed By: lev26518 Q:\210_CIVIL\210E_ENGINEERING_DESIGN_DATA\210E_023_R_Technical_Studies\Hydrology Update-DR115-SDL\A4UV-000-10-SK-0003.dwg

HECA_ENG_SHT013



LEGEND

- IMPERMEABLE LINER
- CONCRETE PAVING
- DRAINAGE AREA BOUNDARY
- STORM WATER DRAINAGE SWALES AND DITCHES
- CULVERT
- EXCESS PONDING AREAS REQUIRED FOR 100 YR STORMS

NOTE:

1. WHERE DISTANCES ARE PROHIBITIVE FOR GRAVITY FLOW, SUMPS AND PUMPS WILL BE USED TO CONVEY RUNOFF TO THE APPROPRIATE DRAINAGE FACILITY FOR WATER TREATMENT OR RETENTION.
2. COLLECTION SUMPS FOR SETTLEMENT OF SOLIDS AND REUSE OF CLARIFIED WATER WILL BE PROVIDED AT SOLIDS HANDLING FACILITIES AT VARIOUS LOCATIONS.
3. UNCONTAMINATED RUN-OFF FROM UNDEVELOPED AREAS WITHIN THE PROJECT SITE AND OUTSIDE THE MAIN PLANT AREA AS WELL AS TEMPORARY USE AREAS WILL DRAIN BY SHEET FLOW TO DITCHES LOCATED ALONG AREA BOUNDARIES AND PLANT ROADS. CULVERTS WILL CONVEY FLOW UNDERNEATH PLANT ROADS AT CROSSING POINTS. RUNOFF COLLECTED IN THIS SYSTEM WILL DISCHARGE TO CLEAN STORM WATER RETENTION BASINS.

   EXISTING DRAINAGE PATTERNS OUTSIDE THE PROJECT SITE WILL REMAIN UNDISTURBED. EXCESS OFFSITE RUNOFF WILL FOLLOW EXISTING DRAINAGE PATTERNS TO CONVEY FLOW AROUND THE SITE. EXISTING DRAINAGE DITCHES LOCATED AT THE SITE PROPERY BOUNDARY WILL BE IMPROVED WHERE NECESSARY.

0 100' 200' 400' 600' 800' 1000'

SCALE: 1"=200'

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
2	9-27-12	ISSUED FOR PERMIT	SDL	SY	GB

REFERENCE DWG NUMBER	REFERENCE DRAWINGS
A4UV-000-50-DG-0001	OVERALL PLOT PLAN

Proprietary Fluor Information Submitted in Confidence
Releasable to DOE Only as Specified in Subcontract No. 674
Not Subject to Release Under FOIA

FLUOR®

CONTRACT	A4UV
DESIGNED BY	S. LEVISEE
CHECKED BY	S. YENCH
SUPERVISOR	CY
LEAD ENGR/SPEC.	JL
ENGR MGR	GB
CLIENT	NA

hydrogen energy

HYDROGEN ENERGY CALIFORNIA LLC
HECA PROJECT
KERN COUNTY, CALIFORNIA

PRELIMINARY STORM WATER PONDING EXHIBIT

SCALE	DRAWING NUMBER	REV
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	CAD FILE NAME A4UV-000-10-SK-0004.dwg	

HECA_ENG_DRT013

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APPENDIX B – EXISTING CONDITIONS ANALYSES

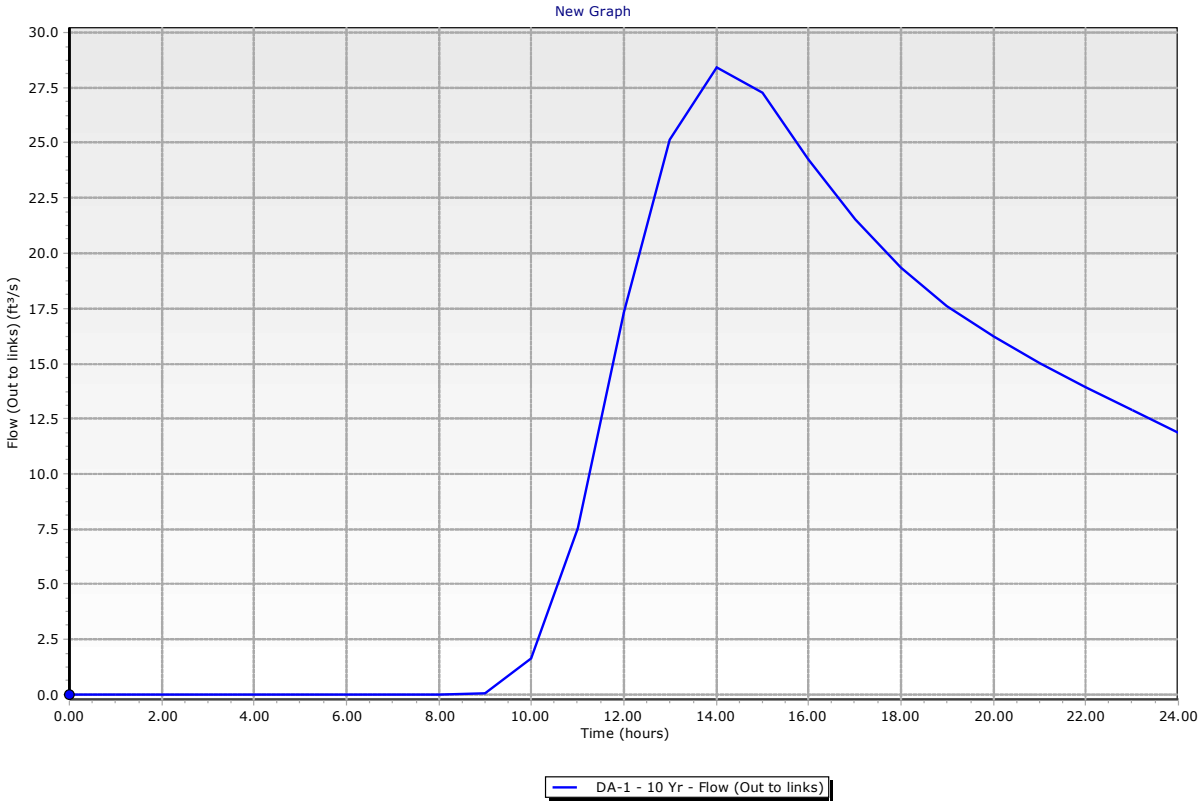
FlexTable: Copy of Catchment Table (HECA REV2 Existing.csd)

Current Time: 0.000 hours

Label	Area (User Defined) (acres)	Composite Tc (hours)	Peak Flow (ft^3/s)	SCS CN	Runoff Volume (ac-ft)
DA-1	453.000	5.289	28.4	85.000	21.01

DRAINAGE AREA HYDROGRAPH-10 YR

EXISTING CONDITION



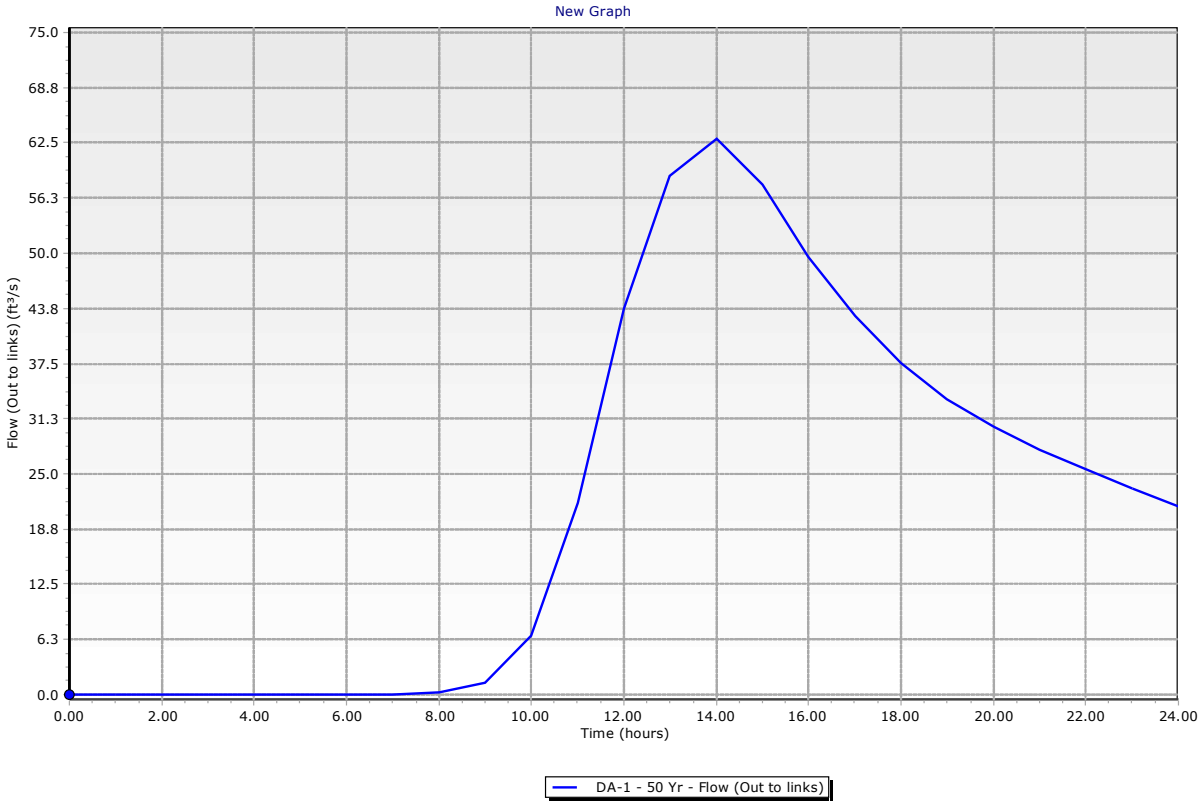
FlexTable: Copy of Catchment Table (HECA REV2 Existing.csd)

Current Time: 0.000 hours

Label	Area (User Defined) (acres)	Composite Tc (hours)	Peak Flow (ft^3/s)	SCS CN	Runoff Volume (ac-ft)
DA-1	453.000	5.289	62.9	85.000	44.18

DRAINAGE AREA HYDROGRAPH - 50 YEAR

EXISTING CONDITION



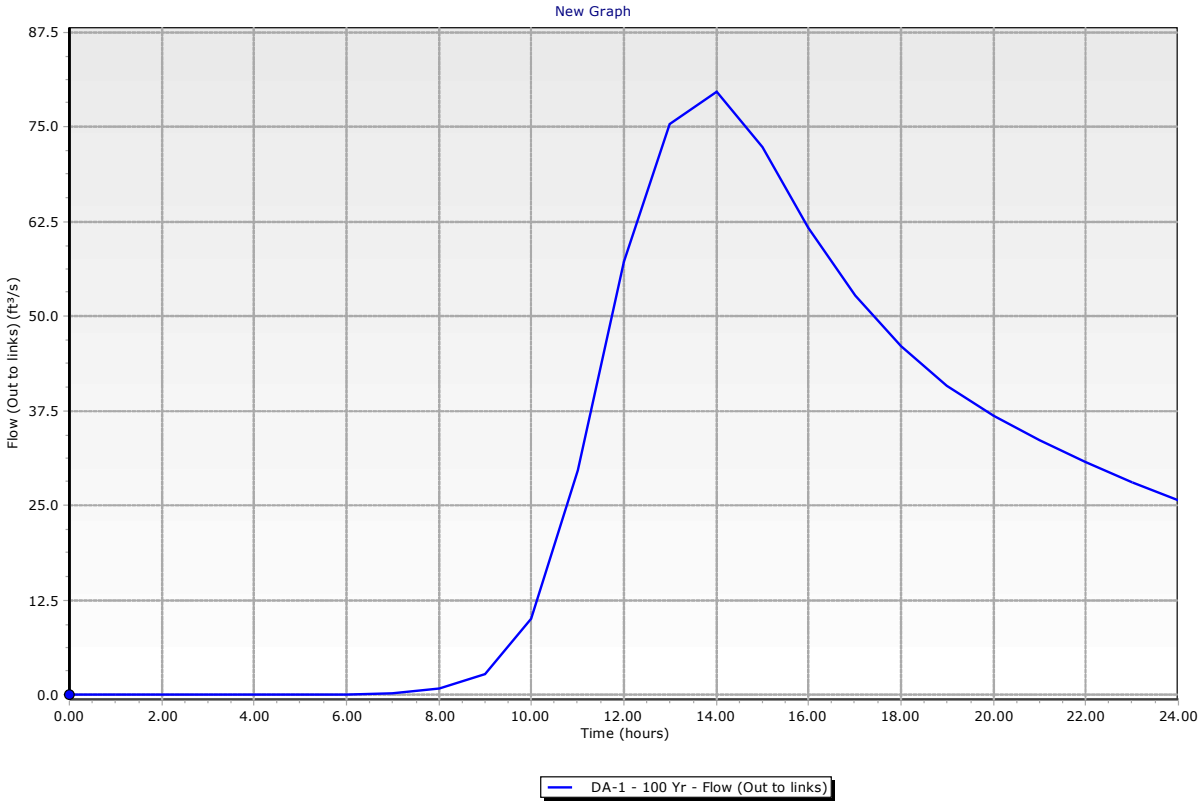
FlexTable: Copy of Catchment Table (HECA REV2 Existing.csd)

Current Time: 0.000 hours

Label	Area (User Defined) (acres)	Composite Tc (hours)	Peak Flow (ft^3/s)	SCS CN	Runoff Volume (ac-ft)
DA-1	453.000	5.289	79.7	85.000	55.49

DRAINAGE AREA HYDROGRAPH - 100 YEAR

EXISTING CONDITION



APPENDIX C – DEVELOPED CONDITIONS ANALYSES

Catchment FlexTable: Table - 1 (HECA REV2.csd)

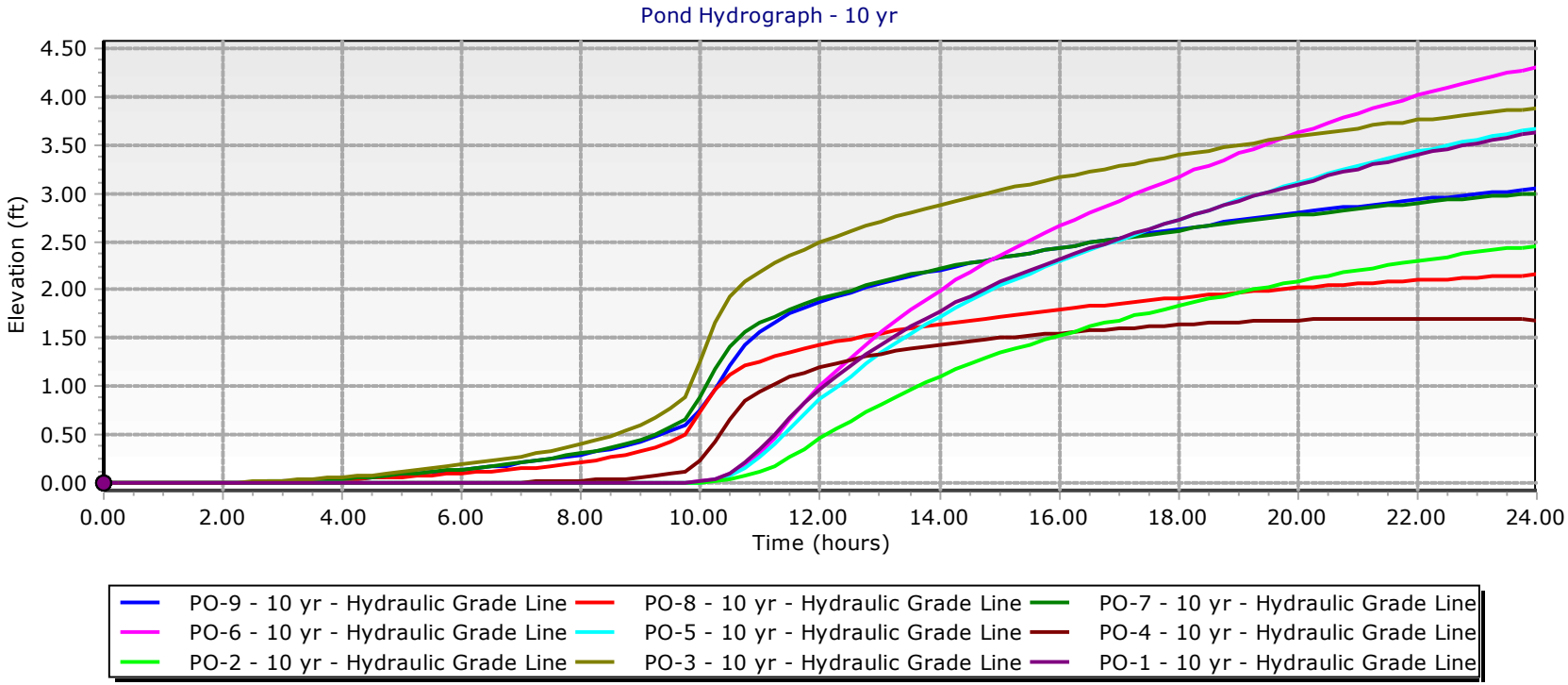
Label	Outflow Node	Area (User Defined) (acres)	SCS CN	Time of Concentration (hours)	Peak Flow (ft^3/s)	Runoff Volume (ac-ft)
DA-1	PO-1	58.000	80.000	1.76	3.88	2.1
DA-2	PO-2	68.500	80.000	2.53	3.76	2.4
DA-3	PO-3	13.300	98.000	0.34	10.06	1.7
DA-4	PO-4	24.000	91.000	0.67	8.86	2.0
DA-5	PO-5	90.700	80.000	2.03	5.54	3.2
DA-6	PO-6	102.500	80.000	2.01	6.34	3.6
DA-7	PO-7	8.500	98.000	0.35	6.39	1.1
DA-8	PO-8	4.800	98.000	0.31	3.93	0.6
DA-9	PO-9	67.200	98.000	0.74	37.70	8.7
DA-7-3	PO-7	5.300	98.000	0.65	3.25	0.7
DA-9-1	PO-9	5.800	98.000	0.52	3.90	0.8
DA-7-2	PO-7	1.900	98.000	0.41	1.24	0.2

FlexTable: Pond Table (HECA REV2.csd)

Label	Elevation (Initial) (ft)	Infiltration (Average) (in/h)	Hydraulic Grade (Maximum) (ft)	Constant Flow (ft^3/s)	Storage (Maximum) (ac-ft)	Flow (Total In Maximum) (ft^3/s)
PO-1	0.00	1.0000	3.60	0.00	1.5	3.88
PO-3	0.00	0.0000	7.55	0.04	1.7	9.89
PO-2	0.00	1.0000	2.44	0.00	1.6	3.76
PO-4	0.00	1.0000	1.71	0.00	1.1	8.81
PO-5	0.00	1.0000	3.65	0.00	2.4	5.53
PO-6	0.00	1.0000	4.27	0.00	2.8	6.33
PO-7	0.00	0.0000	2.99	0.04	2.0	9.69
PO-8	0.00	0.0000	2.15	0.04	0.6	3.83
PO-9	0.00	0.0000	3.03	0.04	9.4	41.39

RETENTION POND HGL - 10 YEAR

PROPOSED CONDITION



Catchment FlexTable: Table - 1 (HECA REV2.csd)

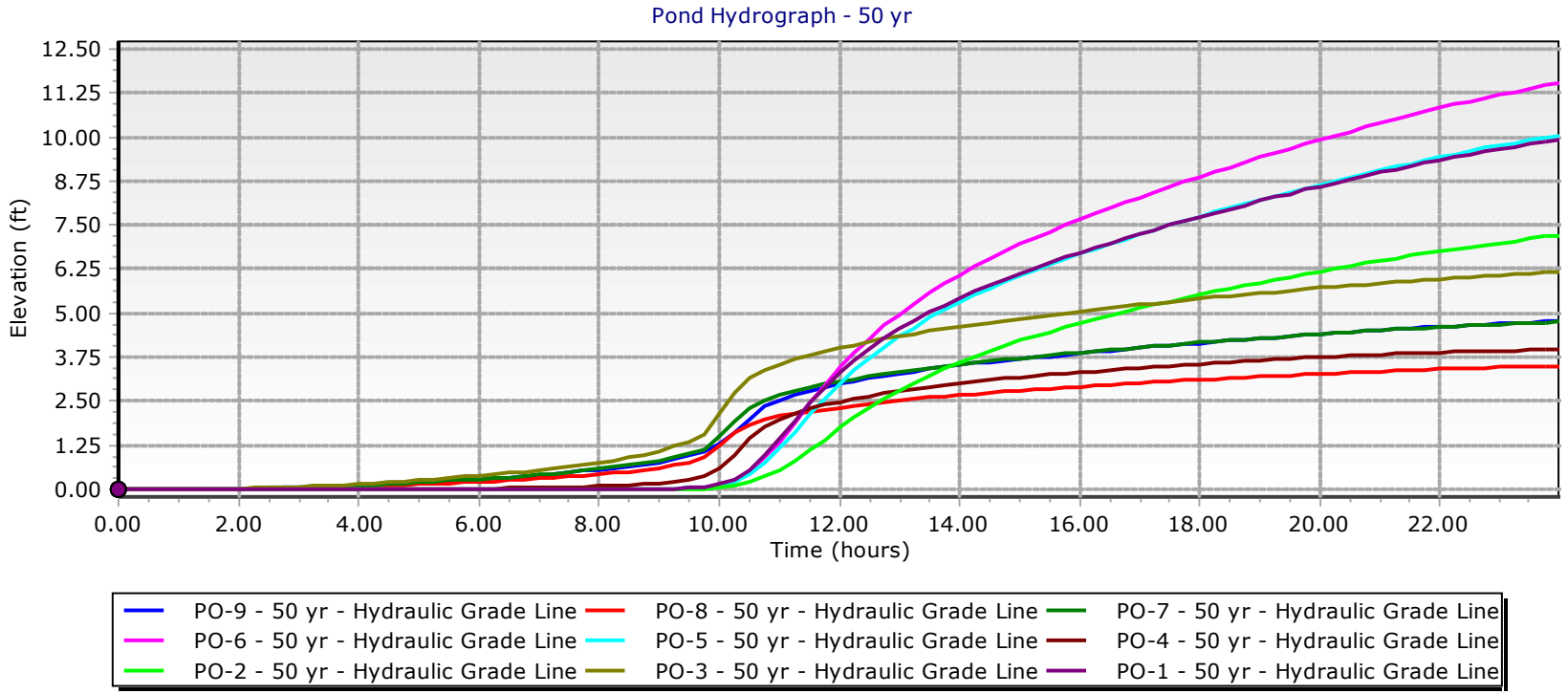
Label	Outflow Node	Area (User Defined) (acres)	SCS CN	Time of Concentration (hours)	Peak Flow (ft^3/s)	Runoff Volume (ac-ft)
DA-1	PO-1	58.000	80.000	1.76	11.19	4.8
DA-2	PO-2	68.500	80.000	2.53	10.65	5.5
DA-3	PO-3	13.300	98.000	0.34	15.53	2.7
DA-4	PO-4	24.000	91.000	0.67	16.66	3.6
DA-5	PO-5	90.700	80.000	2.03	15.90	7.4
DA-6	PO-6	102.500	80.000	2.01	18.21	8.4
DA-7	PO-7	8.500	98.000	0.35	9.86	1.7
DA-8	PO-8	4.800	98.000	0.31	6.06	1.0
DA-9	PO-9	67.200	98.000	0.74	58.18	13.7
DA-7-3	PO-7	5.300	98.000	0.65	5.01	1.1
DA-9-1	PO-9	5.800	98.000	0.52	6.00	1.2
DA-7-2	PO-7	1.900	98.000	0.41	1.91	0.4

FlexTable: Pond Table (HECA REV2.csd)

Label	Elevation (Initial) (ft)	Infiltration (Average) (in/h)	Hydraulic Grade (Maximum) (ft)	Constant Flow (ft^3/s)	Storage (Maximum) (ac-ft)	Flow (Total In Maximum) (ft^3/s)
PO-1	0.00	1.0000	9.88	0.00	4.2	11.19
PO-3	0.00	0.0000	10.00	0.04	2.2	15.26
PO-2	0.00	1.0000	7.16	0.00	4.7	10.65
PO-4	0.00	1.0000	3.95	0.00	2.6	16.55
PO-5	0.00	1.0000	9.99	0.00	6.6	15.90
PO-6	0.00	1.0000	10.00	0.00	6.6	18.21
PO-7	0.00	0.0000	4.74	0.04	3.1	14.98
PO-8	0.00	0.0000	3.50	0.04	0.9	5.90
PO-9	0.00	0.0000	4.76	0.04	14.8	63.85

RETENTION POND HGL - 50 YEAR

PROPOSED CONDITION



Catchment FlexTable: Table - 1 (HECA REV2.csd)

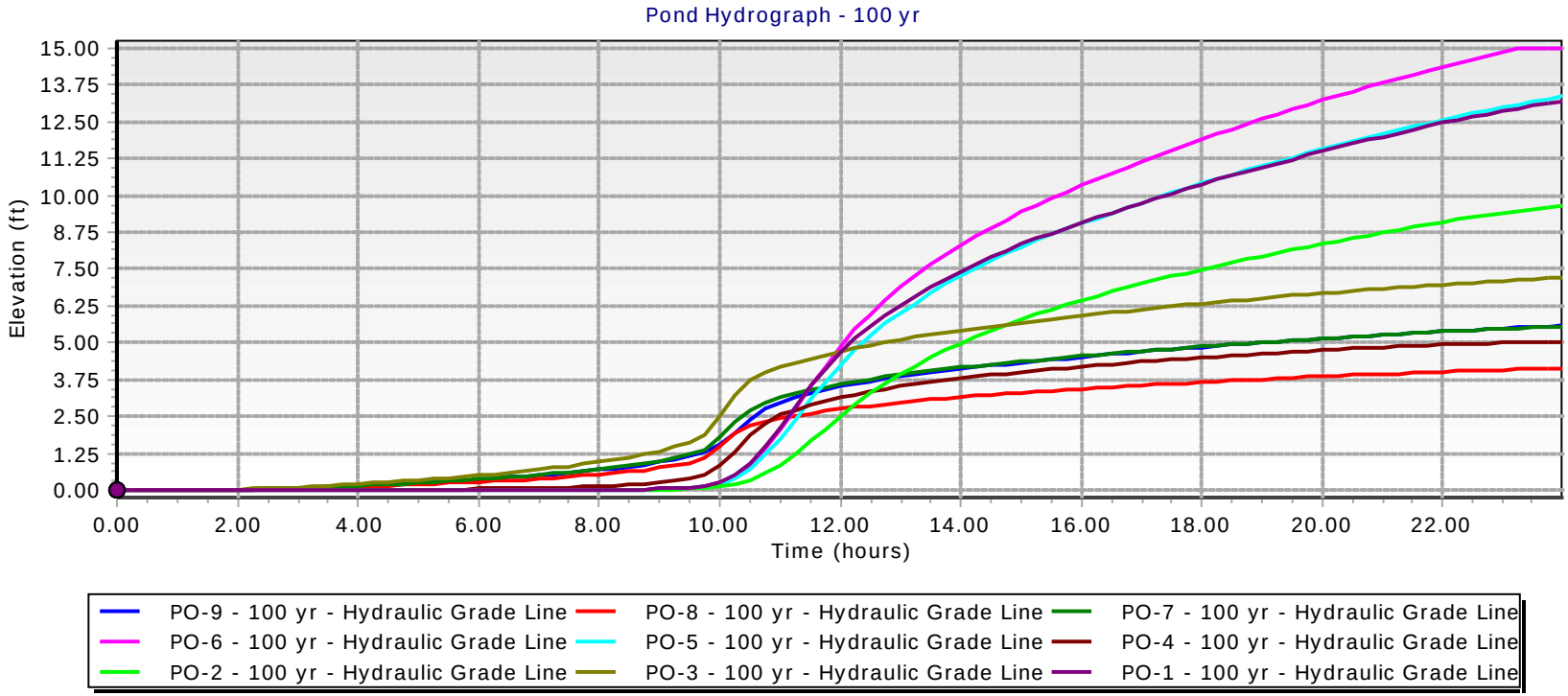
Label	Outflow Node	Area (User Defined) (acres)	SCS CN	Time of Concentration (hours)	Peak Flow (ft^3/s)	Runoff Volume (ac-ft)
DA-1	PO-1	58.000	80.000	1.76	15.15	6.2
DA-2	PO-2	68.500	80.000	2.53	14.36	7.2
DA-3	PO-3	13.300	98.000	0.34	18.00	3.2
DA-4	PO-4	24.000	91.000	0.67	20.31	4.3
DA-5	PO-5	90.700	80.000	2.03	21.57	9.6
DA-6	PO-6	102.500	80.000	2.01	24.68	10.9
DA-7	PO-7	8.500	98.000	0.35	11.43	2.0
DA-8	PO-8	4.800	98.000	0.31	7.03	1.1
DA-9	PO-9	67.200	98.000	0.74	67.43	16.0
DA-7-3	PO-7	5.300	98.000	0.65	5.80	1.3
DA-9-1	PO-9	5.800	98.000	0.52	6.95	1.4
DA-7-2	PO-7	1.900	98.000	0.41	2.21	0.5

FlexTable: Pond Table (HECA REV2.csd)

Label	Elevation (Initial) (ft)	Infiltration (Average) (in/h)	Hydraulic Grade (Maximum) (ft)	Constant Flow (ft^3/s)	Storage (Maximum) (ac-ft)	Flow (Total In Maximum) (ft^3/s)
PO-1	0.00	1.0000	10.00	0.00	4.3	15.14
PO-3	0.00	0.0000	10.00	0.04	2.2	17.68
PO-2	0.00	1.0000	9.62	0.00	6.4	14.35
PO-4	0.00	1.0000	5.04	0.00	3.3	20.18
PO-5	0.00	1.0000	10.00	0.00	6.6	21.57
PO-6	0.00	1.0000	10.00	0.00	6.6	24.68
PO-7	0.00	0.0000	5.54	0.04	3.7	17.36
PO-8	0.00	0.0000	4.12	0.04	1.1	6.84
PO-9	0.00	0.0000	5.56	0.04	17.2	74.00

RETENTION BASIN HGL - 100 YEAR

PROPOSED CONDITION



APPENDIX D – CONSTRUCTION PHASE CONDITIONS ANALYSES

FlexTable: Catchment Table (HECA REV2-CONST.csd)

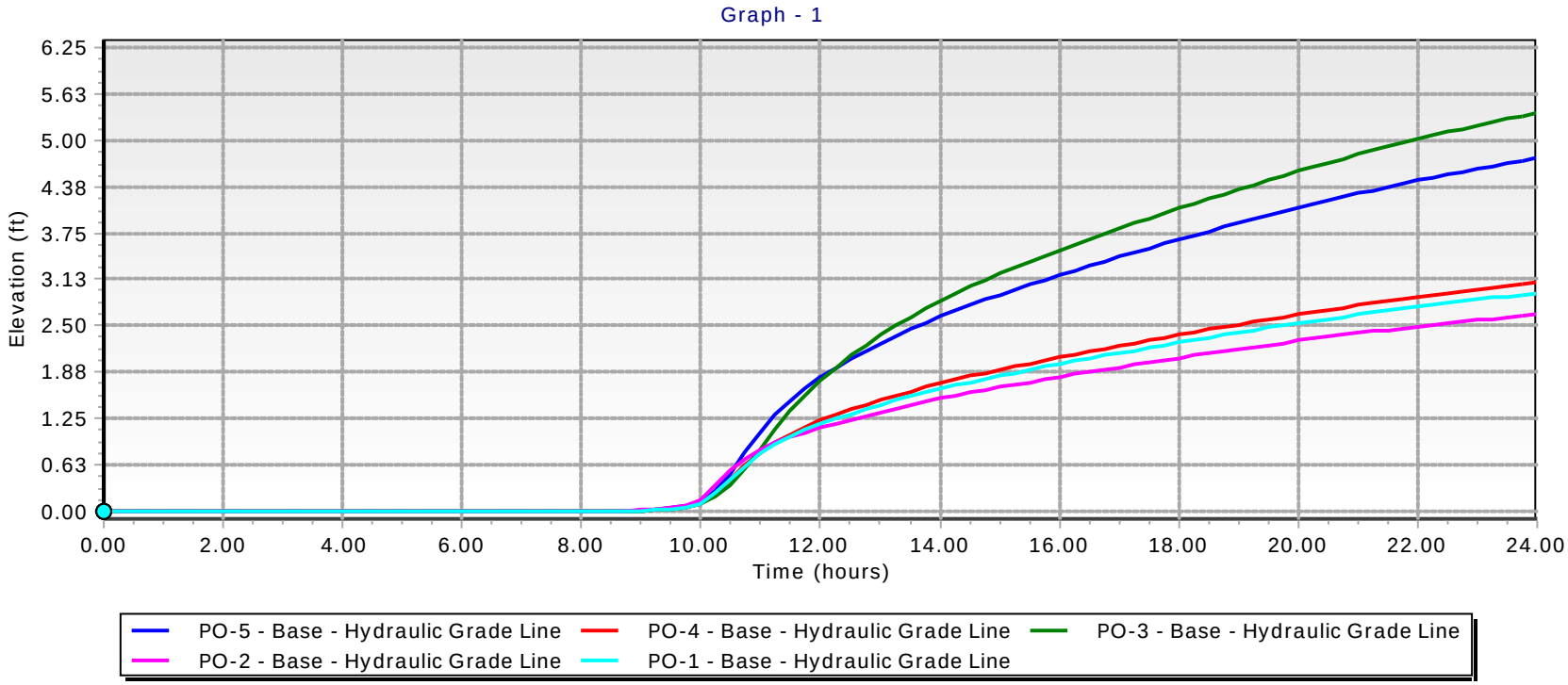
Label	Outflow Node	Area (User Defined) (acres)	SCS CN	Time of Concentration (hours)	Peak Flow (ft^3/s)	Runoff Volume (ac-ft)
CM-1	PO-1	12.800	78.000	0.964	4.19	1.3
CM-2	PO-2	17.600	78.000	0.649	7.14	1.7
CM-3	PO-3	36.500	78.000	1.684	8.56	3.5
CM-4	PO-4	20.600	78.000	1.012	6.52	2.0
CM-5	PO-5	32.000	78.000	1.210	9.15	3.1

FlexTable: Pond Table (HECA REV2-CONST.csd)

Label	Elevation (Initial) (ft)	Infiltration (Average) (in/h)	Hydraulic Grade (Maximum) (ft)	Constant Flow (ft^3/s)	Storage (Maximum) (ac-ft)	Flow (Total In) (ft^3/s)
PO-1	0.00	0.0000	2.92	0.00	1.3	0.00
PO-2	0.00	0.0000	2.63	0.00	1.7	0.00
PO-3	0.00	0.0000	5.33	0.00	3.5	0.00
PO-4	0.00	0.0000	3.06	0.00	2.0	0.00
PO-5	0.00	0.0000	4.73	0.00	3.1	0.00

RETENTION BASIN HGL- 100 YEAR

CONSTRUCTION PHASE



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

AMENDED APPLICATION FOR CERTIFICATION FOR THE HYDROGEN ENERGY CALIFORNIA PROJECT

Docket No. 08-AFC-08A
(Revised 10/9/12)

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Jennifer Jennings
Public Adviser's Office
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DECLARATION OF SERVICE

I, Dale Shileikis, declare that on October 22, 2012, I served and filed a copy of the attached CEC Data Requests Set One (60-Day Extension), dated October, 2012. This document is accompanied by the most recent Proof of Service list, located on the web page for this project at:
http://www.energy.ca.gov/sitingcases/hydrogen_energy/index.html

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:
(*Check all that Apply*)

For service to all other parties:

__X__ Served electronically to all e-mail addresses on the Proof of Service list; CD mailed to those with email inbox restrictions.

____ Served by delivering on this date, either personally, or for mailing with the U.S. Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses marked *"hard copy required" or where no e-mail address is provided.

AND

For filing with the Docket Unit at the Energy Commission:

__X__ by sending one electronic copy to the e-mail address below (preferred method); OR

____ by depositing an original and 12 paper copies in the mail with the U.S. Postal Service with first class postage thereon fully prepaid, as follows:

CALIFORNIA ENERGY COMMISSION – DOCKET UNIT
Attn: Docket No. 08-AFC-08A
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.ca.gov

OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:

____ Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

California Energy Commission
Michael J. Levy, Chief Counsel
1516 Ninth Street MS-14
Sacramento, CA 95814
michael.levy@energy.ca.gov

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.